

**AVNS-DTL-10880 D**  
**3 October 2019**  
**Supersedes**  
**AVNS-DTL-10880 C**  
**6 December 2018**  
**CAGE Code: 81996**

**DETAIL SPECIFICATION**  
**ITEM SPECIFICATION**  
**FOR THE**  
**AIRCREW COMBAT EQUIPMENT (ACE)**



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## REVISION HISTORY

This sheet is a record of each issue of this document.

When the revised document is issued, the previous issue is automatically superseded.

Version	Date	Configuration Management	Pages Changed	Reason for Change
Initial	12 May 2015	ERR-AV-12962	N/A	Initial Release
Rev A	11 May 2016	ERR-AV-13001	All	Update extraction and restraint requirement
Rev B	31 August 2017	ERR-AV-13052		Connect restraint and insertion requirement to Aircrew Tether System specification AVNS-PRF-10855; simplify; and correct typos; Reorganize; comply with MIL-STD-961.
Rev C	19 November 2018	SCN AV-14216	All	Update references to ANSI/ASSE Z359 Fall Protection Code; remove references to MSV & replace with Air Warrior SABI armor; update changes to Air Soldier System since last revision; update to align with Capability Production Document
Rev D	03 October 2019	SCN AV-14253	All	Replace references to ANSI Z359 with applicable requirements. Update flotation requirements.
<b>DETAIL SPECIFICATION, ITEM SPECIFICATION FOR THE AIRCREW COMBAT EQUIPMENT (ACE)</b>				<b>Document Number: AVNS-DTL-10880</b>

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## 1. SCOPE

This specification establishes the performance requirements of the Army Aircrew Combat Equipment (ACE). The purpose of the ACE is to provide a lightweight and low bulk means to wear or carry survival equipment that provides survivability capabilities against battlefield threats (see 6.5) and against induced and/or naturally occurring environmental threats. The ACE will provide the following:

- Man-mounted survival gear carriage system with integrated extraction capability
- Helicopter internal and external restraint devices
- Storage/carriage of survival and Soldier equipment
- Flotation for over water missions
- Small arms and fragmentation protection
- Integration with up to two Enhanced Small Arms Protective Inserts (ESAPIs)

The ACE will be worn:

- by Army Soldiers on flying status whose primary duty is conducting aviation missions whether flying or carrying out cabin crew activities;
- daily for combat missions with durations of 12 day or night hours, which includes ground time, standby or waiting times, and in a minimum of 11 hours of continuous Mission Oriented Protective Posture (MOPP) IV;
- while performing tasks during missions for mounted and dismounted operations (see 6.5) and for day and night operations;
- on the following aircraft: H-64 series (Attack), H-72 series and H-60 series (MEDEVAC (see 6.5) and Utility), H-47 series (Cargo) and selected fixed-wing aircraft.

## 2. APPLICABLE DOCUMENTS

### 2.1. General.

The documents listed in this section are specified in sections 3 and 4 of this specification. This section does not include documents cited in other sections of this specification or recommended for additional information or as examples. While every effort has been made to ensure the completeness of this list, document users are cautioned that they must meet all specified requirements documents cited in sections 3 and 4 of this specification, whether or not they are listed.

### 2.2. Government documents.

#### 2.2.1. Specifications, standards and handbooks.

The following specifications, standards, and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those cited in the solicitation or contract.

#### SPECIFICATIONS

MIL-DTL-83133K	Turbine Fuel, Aviation, Kerosene Type, JP-8 (NATO F-34), NATO F-35, and JP-8+100 (NATO F-37)
MIL-PRF-23699G	Lubricating Oil, Aircraft Turbine Engine Synthetic Base, NATO Code Numbers: O-152, O-154, O-156, and O-167
MIL-PRF-83282D w/Amendment 1	Hydraulic Fluid, Fire Resistant, Synthetic Hydrocarbon Base, Metric, North Atlantic Treaty Organization (NATO) Code Number H-537

#### STANDARDS

MIL-STD-810H	Environmental Engineering Considerations and Laboratory Tests
MIL STD-1472G w/Change 1	Human Engineering

(Copies of these documents are available online at <https://quicksearch.dla.mil/>.)

#### 2.2.2. Other Government documents, drawings and publications.

The following other Government documents, drawings, and publications form a part of this document to the extent specified herein. Unless otherwise specified, the issues are those cited in the solicitation.

Natick/TR-15/007	Technical Report (TR), 2012 Anthropometric Survey of U.S. Army Personnel: Methods and Summary Statistics
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(Copies of this document are available at Defense Technical Information Center, ATTN: DTIC, Suite 0944, 8725 John J. Kingman Road, Fort Belvoir, VA 22060-6218; or National Technical Information Service, Technology Administration, U.S. Department of Commerce, Springfield, VA 22161; or online at <http://www.dtic.mil/>.)

AR 750-1	Army Materiel Maintenance Policy
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(Copies of this document are available online at <http://armypubs.army.mil/epubs/>.)

#### AIR WARRIOR DOCUMENTS AND DRAWINGS

AVNS-PRF-10855C	Performance Specification for the Aircrew Tether System (ATS)
1005923B	Soft Armor Ballistic Insert (SABI), Front
1005924B	Soft Armor Ballistic Insert (SABI), Back
1005938B	Electrostatic Decay Test Method
1028636	Portable Helicopter Oxygen Delivery System (PHODS)

1049858	Lightweight Environmental Control System (LWECS) Assembly (unreleased drawing)
1050702B	Thermal Layered Clothing
1050703B	Cooling Vest
1050800	Over Water Equipment
1050802B	Lightweight Immersion Suit for Aviation (LISA) Assembly
1050882B	Chemical Biological Ensemble
1050921B	72-Hour Survival Equipment (72-HSE)
1680-ALSE-102G	Additional Authorized Items

(Copies of these documents are available upon request from Product Manager – Air Warrior (PM-AW), 6726 Odyssey Drive NW, SFAE-SDR-AW, Huntsville, AL 35806.)

### 2.3. Non-Government publications.

The following documents form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those cited in the solicitation or contract.

#### AMERICAN ASSOCIATION OF TEXTILE CHEMISTS AND COLORISTS (AATCC)

AATCC Evaluation Procedure 9-2017      Visual Assessment of Color Difference of Textiles

AATCC Test Method 22-2017      Water Repellency: Spray Test

AATCC Test Method 135-2018      Dimensional Changes of Fabrics after Home Laundering

(Copies of these documents may be purchased online at <http://www.aatcc.org> or from the American Association of Textile Chemists and Colorists, P.O. Box 12215, Research Triangle Park, NC 27709-2215.)

#### AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI/ASSE Z359.11-2014      Safety Requirements for Full Body Harnesses

ANSI/ASSP Z359.12-2019      Connecting Components for Personal Fall Arrest Systems

(Copies of these documents may be purchased online from the American National Standards Institute at <http://webstore.ansi.org>.)

#### AMERICAN SOCIETY FOR TESTING MATERIALS (ASTM) INTERNATIONAL

ASTM F1930-18      Standard Test Method for Evaluation of Flame Resistant Clothing for Protection Against Flash Fire Simulations Using an Instrumented Manikin

ASTM E284-17      Standard Terminology of Appearance

(Copies of these documents may be purchased from ASTM International, 100 Barr Harbor Drive, PO Box C700, West Conshohocken, PA, 19428-2959 USA or online at <http://www.astm.org>.)

#### PARACHUTE INDUSTRY ASSOCIATION

PIA-W-27265D      Webbing, Textile, Woven Nylon Impregnated

(Copies of this document may be purchased from the Parachute Industry Association, online at <http://www.pia.com> or via email at [speccs@pia.com](mailto:speccs@pia.com))

### 2.4. Order of precedence.

Unless otherwise noted herein or in the contract, in the event of a conflict between the text of this document and the references cited herein, the text of this document takes precedence. Nothing in this

document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

### 3. REQUIREMENTS

- a. Unless otherwise specified, the requirements provided herein shall apply to mounted and dismounted operations (see 6.5) in all mission environments.
- b. Unless otherwise specified, the requirements provided herein shall apply to H-64 series (Attack), H-72 series and H-60 series (MEDEVAC (see 6.5) and Utility), H-47 series (Cargo) and selected fixed-wing aircraft.
- c. Unless otherwise specified, the requirements provided herein shall apply to all environmental and climatic conditions with the body-mounted component temperature range from 125° F to -25° F for mounted and dismounted operations (see Appendix A).
- d. Unless otherwise specified, the requirements provided herein shall apply to aircrew members wearing the Flyer's Glove (see drawing 1050702), the Intermediate Cold Weather Glove, HAU-15P (see drawing 1050702), and for MOPP configurations, the Flyer's Glove worn over 7-mil Butyl Rubber Glove and Glove Liner (see drawing 1050882) to access equipment ambidextrously, with one hand.
- e. Unless specified as an objective [O] (see 6.5), all requirements contained herein are threshold [T] (see 6.5) requirements.
- f. Unless otherwise specified, the requirements provided herein shall apply to aircrew members in the 5th percentile female to the 95th percentile male Army population for weight and stature as defined in Natick/TR-15/007 [T]; 1st percentile female to the 99th percentile male [O].
- g. Unless otherwise specified, static and dynamic tests of requirements provided herein shall be conducted with a Parachute Torso Dummy (Humanetics model 131-001 or equivalent (see 6.10)) weighted to 300 ( $\pm$  2) pounds (lb).

#### 3.1. ACE performance.

The ACE shall be comprised of the following:

- a. Individual ballistic protection
- b. Extraction & retrieval, in-cabin restraint, and insertion
- c. Equipment carriage
- d. Flotation
- e. Drag handle

##### 3.1.1. Individual ballistic protection.

###### 3.1.1.1. ACE ballistic protection components.

The ACE ballistic protection components shall be comprised of panels for small arms and fragmentation protection, and plates for vital torso protection.

###### 3.1.1.1.1. Small arms and fragmentation protection.

The ACE shall provide carriage for one set (front and back panels) of Small Arms Ballistic Inserts (SABI) in each of the five sizes. SABI part numbers for front and back panels in each of the five sizes are delineated in TABLE I.

TABLE I. *SABI part numbers.*

SIZE	Part Number, Front	Part Number, Back
X-Small	1005923-1-1	1005924-1-1
Small	1005923-1-3	1005924-1-3
Medium	1005923-1-5	1005924-1-5
Large	1005923-1-7	1005924-1-7
X-Large	1005923-1-9	1005924-1-9

###### 3.1.1.1.2. Vital torso protection.

The ACE shall provide carriage for the Enhanced Small Arms Protective Inserts (ESAPI), providing one for rated aircrew members (front-mounted only) and two for

non-rated aircrew members (one front- and one back-mounted). ESAPI National Stock Numbers (NSNs) are delineated in TABLE II. The carriage for each of the five sizes of ESAPI shall match the size of SABI panels (TABLE I) carried in each ACE.

TABLE II. *ESAPI NSNs.*

SIZE	NSN
X-Small	8470-01-520-7360
Small	8470-01-520-7370
Medium	8470-01-520-7373
Large	8470-01-520-7385
X-Large	8470-01-520-7382

3.1.1.2. Location of ballistic protection components.

3.1.1.2.1. The ACE shall ensure that, for each size, the SABI front panel (see 3.1.1.1.1) is located with the center point of the front insert neck scye lying at the aircrew member's suprasternal notch (see 6.5).

3.1.1.2.2. The ACE shall ensure that, for each size, the SABI back panel (see 3.1.1.1.1) is located with the center point of the back insert neck scye lying at the C7 vertebra.

3.1.1.2.3. The ACE shall provide, for each size, carriage for two ESAPIs (see 3.1.1.1.2) centered horizontally over each SABI panel (see 3.1.1.1.1), one located over the front panel and one located over the back panel.

3.1.1.2.4. The ACE shall locate, for each size, the front ESAPI (see 3.1.1.1.2) so as to rest with the top edge at or no more than one inch below the suprasternal notch (see 6.5) when aircrew members stand erect.

3.1.1.2.5. The ACE shall locate, for each size, the back ESAPI (see 3.1.1.1.2) so as to rest with the bottom edge vertically even with the front plate ( $\pm$  one inch) when aircrew members stand erect.

3.1.1.3. Tailorability.

The ACE shall provide a means to remove and replace each of the SABI panels (see 3.1.1.1.1) without opening a permanent seam in the carrier.

3.1.1.4. ESAPI ejection.

3.1.1.4.1. The ACE shall provide a means for aircrew members to eject each ESAPI (front and back) (see 3.1.1.1.2) in 15 seconds or less per plate when dismounted (see 6.5) on land.

3.1.1.4.2. The ACE shall provide a means for aircrew members to eject each ESAPI (front and back) (see 3.1.1.1.2) in 15 seconds or less per plate when dismounted (see 6.5) in water.

3.1.2. Extraction & retrieval, in-cabin restraint, and insertion.

The ACE components for emergency extraction and retrieval by hoist (see 6.6.a), retrieval by external attachment to the fuselage (see 6.5) (an alternative form of emergency extraction) (see 6.6.b), in-cabin restraint (see 6.6.c), and MEDEVAC insertion and patient retrieval (see 6.6.d) shall be as follows:

3.1.2.1. Emergency extraction by hoist.

3.1.2.1.1. Extraction components.

The components for emergency extraction and retrieval by hoist shall be comprised of a full-body harness (FBH) (see 3.1.2.5 and 6.5) with an attached or integral front-mounted extender (see 6.5), and carabiner(s) (see 3.1.2.5.4).

3.1.2.1.2. Extraction interfaces.

- a. The far end of the front-mounted extender shall interface with Cargo and Utility helicopter rescue hooks (see 6.8).
- b. The length of the extender shall, during extraction and insertion of an aircrew member, contribute to positioning the aircrew's head to be out of range of contact with the helicopter rescue hook.
- c. The attached or integral extender (see 3.1.2.1.1) shall enable ambidextrous one-handed hookup to the helicopter rescue hook during recovery on land.
- d. The attached or integral extender shall enable ambidextrous one-handed hookup to the helicopter rescue hook during recovery from water.

3.1.2.1.3. Extraction constraints.

- a. The extraction components shall limit the aircrew free-fall distance to two feet or less.
- b. During extraction by hoist from land, the FBH shall position the unresponsive aircrew member (attached at the front) in a vertically stationary, seated, and slightly reclining posture.
- c. During extraction by hoist from water, the FBH shall position the unresponsive aircrew member (attached at the front) in a vertically stationary, seated, and slightly reclining posture.
- d. During extraction, the FBH shall provide a means for the aircrew member to remain suspended by a hoist in a seated position for no less than 15 minutes without unbearable irritation or pain.

3.1.2.2. External attachment to the fuselage.

3.1.2.2.1. External attachment components.

Components for secure attachment of an aircrew member seated external to the cockpit shall be comprised of an FBH (see 3.1.2.5), extender (see 6.5), and carabiner(s) (see 3.1.2.5.4). An additional extender (see 6.5) may be included if needed to meet this requirement.

3.1.2.2.2. External attachment interfaces.

The components for secure attachment to an H-64 series fuselage shall interface with authorized aircraft anchorages (designated per aircraft manual) while the aircrew member is seated external to the cockpit.

3.1.2.3. In-cabin safety restraint.

3.1.2.3.1. In-cabin safety restraint components.

In-cabin safety restraint components for mobile cabin crewmembers shall be comprised of the FBH (see 3.1.2.5) and a dorsal-mounted lanyard (see 6.5) system in conformance with the Aircrew Tether System AVNS-PRF-10855.

3.1.2.3.2. In-cabin safety restraint interfaces.

The dorsal-mounted lanyard system shall interface with authorized anchorages in the helicopter cabin (designated per aircraft manual) for routine safety of mobile crewmembers.

3.1.2.3.3. In-cabin safety restraint constraints.

The dorsal-mounted lanyard system (see 3.1.2.3.1) shall be replaceable at the Aviation Unit Maintenance (AVUM) level.

3.1.2.4. Repetitive MEDEVAC insertion and retrieval.

3.1.2.4.1. Insertion components.

Repetitive MEDEVAC insertion and retrieval mission equipment shall be comprised of the FBH (see 3.1.2.5), extender (see 6.5), and carabiner(s) (see 3.1.2.5.4). An additional extender (see 6.5) may be included if needed to meet this requirement.

3.1.2.4.2. Insertion constraints.

3.1.2.4.2.1. The ACE, with all required equipment attached, shall not interfere with the hoisted aircrew member's view of their feet and the aircraft during hoist operations. Note: the intent is to be able to clear for obstacles.

3.1.2.4.2.2. The ACE shall allow the medic to move from helicopter anchorage to hoist hook-up with visual assurance of secure hardware connection to the hoist prior to disengaging from the dorsal-mounted lanyard (3.1.2.3.1).

3.1.2.5. Full-body harness.

Note: Requirements in this section are in part adapted from ANSI/ASSE Z359.11-2014.

3.1.2.5.1. Full-body harness physical characteristics.

3.1.2.5.1.1. The full-body harness (FBH) shall have both dorsal (for mobile aircrew retention in the aircraft cabin) and front-mounted (for aircrew extraction and insertion operations) attachment points.

- a. The dorsal-mounted attachment point shall be positioned at the aircrew member's back (dorsal (see 6.5) position) along the mid-spine (see 6.5) and between the aircrew member's shoulder blades (see 6.5).
- b. A front-mounted attachment point shall be symmetrically located in the vertical plane of the body near the sternum.

3.1.2.5.1.2. The FBH shall permanently include a load bearing sub-pelvic strap.

3.1.2.5.1.3. FBH shoulder straps shall come together at the dorsal location and either cross, be connected by webbing or attach with a connector meeting the requirements of 3.1.2.5.4. Connecting hardware.

3.1.2.5.1.4. The FBH shall permanently incorporate a waist belt or back strap, or other means of controlling the separation of the shoulder straps on the back of the FBH.

3.1.2.5.1.5. The FBH shall be equipped with a fall arrest indicator that will deploy at an applied load of 1000 lbs (-0/+250) when attached to the dorsal attachment element.

3.1.2.5.1.6. The FBH shall be equipped with a fall arrest indicator that will deploy at an applied load of 1000 lbs (-0/+250) when attached to the sternal attachment element.

3.1.2.5.1.7. If the FBH is integrated into a vest, the design shall allow visual inspection of the harness components and fall arrest indicators.

3.1.2.5.1.8. The FBH shall include strap retainers (keepers) or other components which serve to control the loose ends of straps.

3.1.2.5.1.9. All single-point attachment elements shall distribute an induced load symmetrically throughout the FBH load path.

3.1.2.5.2. Full-body harness performance characteristics.

3.1.2.5.2.1. After a Dynamic Feet-First Fall of no less than eight feet vertical distance using the *dorsal attachment element*, the FBH shall meet the following criteria:

- a. FBH shall not release the test torso.

- b. FBH shall support the test torso for a period of 5 minutes post fall.
- c. FBH shall support the test torso, post fall at an angle not greater than 40° to vertical.
- d. At least one fall arrest indicator shall be deployed visibly and permanently.
- e. Any deformation of gated hardware shall not be sufficient to release the gate.

3.1.2.5.2.2. After a Dynamic Head-First Fall of no less than eight feet vertical distance using the *dorsal attachment element*, the FBH shall meet the following criteria:

- a. FBH shall not release the test torso.
- b. FBH shall support the test torso for a period of 5 minutes post fall.
- c. FBH shall support the test torso, post fall at an angle not greater than 40° to vertical.
- d. At least one fall arrest indicator shall be deployed visibly and permanently.
- e. Any deformation of gated hardware shall not be sufficient to release the gate.

3.1.2.5.2.3. When subjected to a Static Feet-First load using the *dorsal attachment element*, the FBH shall meet the following criteria after holding for no less than 60 seconds at 3600 lbf:

- a. FBH shall not release the test torso.
- b. Slippage through any adjuster in the load path shall not exceed 1 inch.
- c. Straps in the load path shall not show any signs of tearing.

3.1.2.5.2.4. After a Dynamic Feet-First Fall of no less than four feet vertical distance using the *sternal attachment element*, the FBH shall meet the following criteria:

- a. FBH shall not release the test torso.
- b. FBH shall support the test torso for a period of 5 minutes post fall.
- c. FBH shall support the test torso, post fall at an angle not greater than 50° to vertical.
- d. If incorporated, at least one fall arrest indicator shall be deployed visibly and permanently.

3.1.2.5.2.5. When subjected to a Static Feet-First using the *sternal attachment element*, the FBH shall meet the following criteria:

After 60 seconds at 800 lbf:

- a. Webbing in the load path shall not slip through adjusters.
- b. Stitches in the load path shall not be broken.
- c. Straps in the load path shall not show any signs of tearing.

After 60 seconds at 3600 lbf:

- a. FBH shall not release the test torso.
- b. Slippage through any adjuster in the load path shall not exceed 1 inch.
- c. Straps in the load path shall not show any signs of tearing.

### 3.1.2.5.3. Full-body harness material characteristics.

Note: Requirements in this section are in part adapted from ANSI/ASSP Z359.11-2014.

#### 3.1.2.5.3.1. Load-bearing straps.

- a. Straps, except soft loop attachments, shall not be less than 1-5/8 inches in width.
- b. Straps shall be made from pure, non-recycled synthetic material having the strength, aging, abrasion, and heat resistance characteristics equivalent or superior to polyamide or polyester.

- c. Strap ends shall be either hot cut, sealed, covered or stitched to prevent fraying.
- d. Straps in contact with metal connectors shall be protected from wear.
- e. Straps shall meet the requirements of PIA-W-27265, Class R or equivalent.

3.1.2.5.3.2. Thread and stitching.

- a. All thread shall be of the same material as the load bearing straps.
- b. All stitching shall be lock-stitched and be securely backstitched to prevent unraveling.
- c. All stitching used to connect load bearing members shall be contrasting in color to the load bearing straps of the FBH to facilitate visual inspection.

3.1.2.5.4. Connecting hardware.

Note: Requirements in this section are in part adapted from ANSI/ASSP Z359.12-2019.

- a. The finish of all hardware shall be clean and free of scale, rust, and deposits of foreign matter.
- b. Hardware surfaces which may come in contact with textile materials shall be free of burrs, pits, sharp edges or rough surfaces.
- c. D-Rings, O-Rings and Oval Rings shall withstand a tensile load of 5,000 lb without breaking.
- d. Buckles, and adjuster hardware shall withstand a minimum tensile load of 3,372 lb without breaking.
- e. Snaphooks and carabiners.
  - i. Carabiners shall be self-closing and self-locking.
  - ii. Carabiners shall open only with two consecutive deliberate actions.
  - iii. Carabiners shall open ambidextrously by the aircrew member, with one hand.
  - iv. Snaphooks and carabiners shall withstand a 5,000 pound tensile load without breaking or separating from the nose of the snaphook or carabiner body by more than 0.125 inch.
  - v. The gate of snaphooks and carabiners shall withstand a minimum minor axis load of 3,600 pounds applied to a point midway between the nose and gate hinge without breaking or distortion sufficient to release the gate.

3.1.3. Equipment carriage.

3.1.3.1. Mission equipment interfaces.

3.1.3.1.1. The ACE shall provide the means to carry and stow mission equipment. The mission equipment includes:

- a. Extender (see 3.1.2.1.1)
- b. 72-Hour Survival Equipment (72-HSE) (see drawing 1050921)
- c. Survival Egress Air (SEA)-LV2 model underwater breathing device IAW product code 1084-15, CAGE 94120
- d. Portable Helicopter Oxygen Delivery System (PHODS) (see drawing 1028636)
- e. Current Army 9-millimeter (mm) service weapon
- f. Three extra 9-mm ammunition magazines (assuming 4th magazine to be stored in weapon)

- g. Four M-4 magazines with 30-round capacity
- h. Encryptable Aircrew Wireless Intercom System (EAWIS) radio (NSN: 5821-01-603-0004) configured with the Wireless Encryption Device (WED) (NSN: 5810-01-591-3520)
- i. Encryptable Aircrew Wireless Intercom System (EAWIS) radio (NSN: 5821-01-603-0004) configured without the WED
- j. Combat Survivor Evader Locator (CSEL) radio (NSN: 5820-01-499-4473)
- k. M-45 blower for chemical mask
- l. Lightweight Environmental Control System (LWECS) Assembly (see drawing 1049858)
- m. Chemically-hardened hydration system
- n. Soldier Power And Data Electrotexile System (SPADES)

3.1.3.1.2. The ACE shall locate the mission equipment delineated in 3.1.3.1.1 for access by aircrew members during and immediately following an emergency landing or ditching.

3.1.3.2. Loss-prevention component.

The ACE equipment carriage shall provide tethers for the 72-HSE components (see drawing 1050921), individually or packaged together, excluding only the tourniquet and the thin cinch bandage.

3.1.3.3. Statically located equipment.

3.1.3.3.1. The ACE shall provide a standard location for storage and attachment of the tourniquet (component of drawing 1050921) and extender (see 3.1.2.1.1.a) for all aircraft and all mission configurations regardless of crew position.

3.1.3.3.2. The ACE shall provide stowage for the extender in a configuration that is ready to connect to the aircraft hoist.

3.1.3.3.3. The ACE shall provide a location that supports access and retrieval of the tourniquet ambidextrously with one hand within 10 seconds by aircrew members.

3.1.3.3.4. The ACE shall provide a location that supports access and retrieval of the extender ambidextrously with one hand within 10 seconds by aircrew members.

3.1.3.4. Holster for the defensive weapon.

3.1.3.4.1. The ACE shall provide a holster for the defensive weapon (see 3.1.3.1.1.e).

3.1.3.4.2. The ACE holstering solution shall be configurable for right-handed and for left-handed users.

3.1.3.4.3. The ACE holstering solution shall provide multiple holstering options that do not interfere with ACE function, and supports aircrew mission duties and proper weapon usage.

3.1.4. Flotation.

3.1.4.1. Flotation performance.

3.1.4.1.1. Integral flotation component.

The ACE flotation component shall, at a minimum, include an inflatable bladder that is contained within a protective casing [T]; and the protective casing shall be an integral (see 6.5) portion of the ACE structure [O].

3.1.4.1.2. Primary and contingency cells.

The ACE bladder (see 3.1.4.1.1) shall include a primary cell and a contingency cell that functions as an emergency backup in case the primary cell fails during use.

3.1.4.1.3. Helmet compatibility.

Prior to inflation, the location of the ACE flotation component (see 3.1.4.1.1) shall not add more than ¼ inch [T]; shall not add thickness [O] at the aircrew member's mid-shoulder (see 6.5) as a means to minimize interference with helmet and helmet components.

3.1.4.1.4. Buoyancy.

The ACE bladder (see 3.1.4.1.1) shall provide no less than 65 lbf of buoyancy (see 6.7) in fresh water and at ambient temperature.

3.1.4.1.5. Removable bladder.

The ACE bladder (see 3.1.4.1.1) shall be removable to allow for ACE configuration without the bladder (over-land configurations), and for inspection, repair, replacement and repacking for reuse.

3.1.4.1.6. Pressure.

The ACE bladder (see 3.1.4.1.1) shall be able to withstand 5 lb per square inch gauge (psig) inflation pressure without visible separation of any seams or welded joints and without any damage to any of the bladder's construction materials.

3.1.4.1.7. Fatigue.

The ACE bladder (see 3.1.4.1.1) shall be able to withstand, without damage, four consecutive inflations to 5 psig. While the pressure is applied, there shall not be any abnormal folding or puckering of the seams in the inflated bladder. After deflation, there shall not be any visible separation of any seams or welded joints nor any damage to any of the bladder's construction and materials.

3.1.4.1.8. Leakage.

Both bladder cells (see 3.1.4.1.2) shall be able to be inflated to 2 psig and the pressure shall not drop below 1.6 psig four hours (+10/-0 minutes) after inflation. There shall not be any visible separation of any seams or welded joints nor any damage to any of the bladder's construction materials.

3.1.4.1.9. Burst.

The ACE bladder (see 3.1.4.1.1), when inflated, shall not burst at a pressure less than 10 psig.

3.1.4.2. Flotation physical characteristics.

3.1.4.2.1. Manual actuation.

The ACE bladder inflation shall be attained only when manually actuated by the aircrew member.

3.1.4.2.2. Single-action actuation.

The primary and contingency cells (see 3.1.4.1.2) shall require only one simultaneous action by the aircrew member for actuation of both cells.

3.1.4.2.3. Oral inflation tubes.

The ACE bladder shall have oral inflation tubes for each cell (see 3.1.4.1.2) that can be accessed and utilized by aircrew members while dismounted in water.

3.1.4.2.4. Locking oral inflation tubes.

The oral inflation tubes (see 3.1.4.2.3) shall have an integral method for locking in the closed position.

3.1.4.2.5. Gas evacuation aid.

The ACE primary cell and contingency cell (see 3.1.4.1.2) shall include an internal string or similar device to aid Aviation Aircrew Life Support and Equipment officers in complete evacuation of gas after inflation for purposes of repacking and reuse.

3.1.4.2.6. Abrasion protection.

The ACE bladder(s) shall be protected from abrasive and from metallic surfaces.

3.1.4.2.7. Shelf and service life record.

The ACE shall have a means to track and record shelf life and service use of the bladder(s).

3.1.4.3. In-water performance.

3.1.4.3.1. Auto-righting, conscious.

When deployed, the ACE flotation component shall automatically position a conscious immersed aircrew member in a stable face-up position for unimpeded breathing.

3.1.4.3.2. Auto-righting, unresponsive.

When deployed, the ACE flotation component shall automatically position an unresponsive immersed aircrew member in a stable face-up position for unimpeded breathing.

3.1.4.3.3. Auto-righting, partial inflation.

As an objective, the ACE flotation component shall meet the requirements of 3.1.4.3.1 and 3.1.4.3.2 when each cell is inflated independently [O].

3.1.4.3.4. Freeboard.

When deployed, the ACE flotation component shall position unresponsive aircrew members with the mouth clear of the water surface by at least 4 ½ inches vertical.

3.1.4.3.5. One-handed access and operation (immersed).

When deployed, the ACE flotation component shall provide immersed aircrew members with access to body-mounted equipment (see 3.1.3.1.1) ambidextrously with one hand.

3.1.4.3.6. Water survival mobility.

The ACE flotation component shall not prevent or hinder aircrew members in performance of water survival actions including:

- a. deployment of Survival Egress Air (SEA)-LV2;
- b. underwater egress from an inverted multi-place aircraft through doors and through windows, in dark condition;
- c. inflation of the flotation device;
- d. ejection of the ballistic plates;
- e. physical check to ensure that all survival equipment in the ACE is within reach;
- f. reach, inflation and donning of the inflatable mittens stowed as a component of the LISA Assembly (see drawing 1050802);
- g. swimming to reach a deployed multi-place life raft;
- h. ingress into the deployed multi-place life raft (allowable to remove inflatable mittens and/or to reduce air pressure in the flotation device);
- i. self-rescue by hoist with rotor downwash.

3.1.4.3.7. Neutral buoyancy.

As an objective [O], the ACE will provide the aircrew member in the Combat Basic Over Water configuration (see Appendix A, TABLE IX) with neutral buoyancy for no less than five minutes.

3.1.5. Drag handle.

The ACE shall have a webbing loop that allows a Soldier to retrieve a non-responsive aircrew member weighing a maximum of 275 lbs plus Soldier equipment from an aircraft and drag to a location away from the aircraft.

3.2. ACE physical characteristics.

3.2.1. Weight and bulk reduction.

3.2.1.1. Weight reduction.

The total weight of the ACE components, not including ACE ballistic protection inserts (see 3.1.1.1), shall provide a 30% reduction from Air Warrior legacy components. Note: Air Warrior equipment weights are provided in Appendix B for information only.

3.2.1.2. Bulk reduction.

The total bulk of the ACE components, not including ACE ballistic protection inserts (see 3.1.1.1), shall provide a 15% reduction from Air Warrior legacy components. Note: Air Warrior equipment bulk measurements are provided in Appendix B for information only.

3.2.2. Low luster.

Any ACE hardware component that is exposed during use and wear shall have a matte or flat surface finish as defined in ASTM E284.

3.2.3. Dissimilar metals.

Dissimilar metals shall not be used in direct contact with each other unless protected against electrolytic corrosion.

3.2.4. Tailorability.

The ACE shall be modular and tailorable into each of the configurations delineated in Appendix A.

3.2.5. Anthropometric sizing.

3.2.5.1. Size distribution.

Any ACE sizes shall be aligned with SABI (see 3.1.1.1.1) sizes using no greater than the number of SABI sizes [T]; using only one ACE size to integrate with all SABI sizes [O].

3.2.5.2. Basis of issue.

The ACE shall fit aircrew members in any configuration (see Appendix A) without requiring individual aircrew members to be issued more than one size.

3.2.6. Signature protection.

3.2.6.1. Visual protection.

The color and appearance of textile (see 6.5) components of the ACE shall maintain a color difference of Equal, Slight or Noticeable IAW AATCC Evaluation Procedure (EP) 9, Table III Color Difference Magnitude Descriptors compared to the standard sample (see 6.3) when viewed using the AATCC EP 9, Option A or C, with sources simulating artificial daylight D75 illuminant with color temperature of 7500 ( $\pm 200$ ) Kelvin (K) illumination of 100 ( $\pm 20$ ) foot-candles, and compared to the standard sample under incandescent lamplight at 2856 ( $\pm 200$ )K.

3.2.6.2. Infrared protection.

The visible textile components of the ACE shall be controlled in the infrared range IAW the spectral reflectance table for the specific color or pattern (see 6.2 and 6.3). Spectral reflectance values shall not be outside the range limits at more than three of the wavelengths specified.

3.2.6.3. Aural protection.

The ACE, with all components operational, shall be aurally non-detectable at a distance of 32.8 feet (10 meters) when the aircrew member is employing escape/evasion and camouflage/concealment techniques.

3.2.6.4. Light signature protection.

ACE devices that emit light shall have a switch for on and off.

3.2.7. Labeling.

Labeling shall be provided using MIL-STD-1472 for guidance whenever there is a necessity for personnel to identify, interpret, follow procedures, and/or avoid hazards.

3.2.8. Water drainage.

ACE components shall have features that allow water to drain during rain exposure and after full submersion of components.

3.3. Interfaces.

The following interfaces are of special concern for ACE optimization.

3.3.1. ACE to clothing and equipment interfaces.

3.3.1.1. Thermal Layered Clothing.

3.3.1.1.1. The ACE shall provide adjustment for use with the Thermal Layered Clothing (see drawing 1050702).

3.3.1.1.2. The ACE shall not interfere with any connection between the Cooling Vest (see drawing 1050703) and the aircraft interface, located at the right-hand side of pilot (see 6.5) and copilot (see 6.5) cockpit seats.

3.3.1.2. Over Water Equipment.

3.3.1.2.1. The ACE shall provide adjustment and attachment as needed for use with the Over Water Equipment (see drawing 1050800).

3.3.1.2.2. The ACE shall not interfere with the function of the Over Water Equipment.

3.3.1.3. Chemical/Biological (CB) Ensemble.

3.3.1.3.1. The ACE shall provide adjustment and attachment as needed for use with the Chemical/Biological Ensemble (see drawing 1050882).

3.3.1.3.2. The ACE shall not interfere with the function of the Chemical/Biological Ensemble.

3.3.1.4. Helmet.

3.3.1.4.1. The ACE shall not interfere with aircrew helmets:

- a. Rotary Wing Helmet (RWH), HGU-56/P
- b. Apache Aircrew Integrated Helmet (AAIH)
- c. Integrated Helmet Unit (IHU)

3.3.1.4.2. The ACE shall not interfere with Helmet Mounted Displays:

- a. CHMD (Common Helmet Mounted Display)
- b. ANVIS (Aviator's Night Vision Imaging System)
- c. HDU (Helmet Display Unit)

3.3.1.4.3. The ACE shall not interfere with auxiliary helmet components listed in drawing 1680-ALSE-102, Additional Authorized Items.

3.3.2. ACE to aircraft interfaces.

3.3.2.1. The ACE shall not require modifications to the aircraft cockpit seats.

3.3.2.2. The ACE shall not interfere with any aircraft seat restraints and crash survival systems when secured by aircrew members wearing each of the configurations in Appendix A.

3.3.2.3. The ACE shall not require additional anchorage for cabin crewmembers other than those that are authorized for cabin restraint of personnel.

3.4. Fabric properties and finishes.

3.4.1. Cleaning/laundrying.

ACE components shall be spot cleanable using readily available non-chlorine detergent, water and soft brush or cloth.

3.4.2. Flash fire protection.

3.4.2.1. The ACE shall provide the aircrew member protection from a flash fire.

3.4.2.2. The ACE, when exposed to a flash fire, shall retain all stowed equipment.

3.4.3. Water repellency.

The ACE shall provide water repellency for any ballistic protection component carriage (see 3.1.1.1) and any equipment carriage (see 3.1.3.1.1) component fabrics of the ACE.

3.4.4. Non-corrosive finishes.

Finishes used on textiles or components of the ACE shall not cause corrosion to brass hardware or any other materials permanently affixed to the ACE.

3.4.5. Anti-static property.

The outer cloth or covering of the ACE shall provide an anti-static characteristic (see 6.9) through the inclusion of static dissipative fiber or other inherent means that is not reduced by cleaning (see 3.4.1).

### 3.5. Environmental performance.

#### 3.5.1. High-temperature storage.

Following exposure to high transportation and storage temperatures, the ACE hardware shall be operable, and have no binding of mechanical components. Materials shall not crack, shrink, craze, delaminate, corrode, discolor, or degrade physical properties that affect function.

#### 3.5.2. Low-temperature storage.

Following exposure to low transportation and storage temperatures, the ACE hardware shall be operable, and have no binding of mechanical components. Materials shall not crack, shrink, craze, delaminate, corrode, discolor, or degrade physical properties that affect function.

#### 3.5.3. Humidity.

Following exposure to hot-humid conditions, ACE hardware shall be operable, have no binding of mechanical components, and shall not crack, shrink, craze, delaminate, corrode, or discolor.

#### 3.5.4. Fungus.

The ACE shall not support fungal growth. Following exposure to fungi, ACE hardware shall be operable and shall have no clogging or binding of mechanical components.

#### 3.5.5. Salt fog.

The ACE shall not corrode in a salt fog atmosphere. Following exposure, ACE hardware shall be operable, have no binding of mechanical components. Materials shall not delaminate, corrode, or discolor. Post-test presence of white scale on hardware surfaces is permitted.

#### 3.5.6. Rain.

Following exposure to rain, ACE hardware shall be operable, have no binding of mechanical components, and shall not crack, shrink, delaminate, corrode, or discolor.

#### 3.5.7. Blowing dust.

Following exposure to blowing dust, ACE hardware shall be operable and have no clogging or binding of mechanical components. Materials shall not delaminate, corrode, or discolor.

#### 3.5.8. Blowing sand.

Following exposure to blowing sand, ACE hardware shall be operable and have no clogging or binding of mechanical components. Materials shall not delaminate, corrode, or discolor.

#### 3.5.9. Fluid contamination.

Following exposure to the battlefield contaminants identified in TABLE III. ACE hardware shall be operable, have no clogging or binding of mechanical components. ACE materials and hardware shall not crack, shrink, craze, delaminate, corrode, or discolor.

TABLE III. *Fluid contaminants.*

MIL-PRF-83282, Hydraulic Fluid, Synthetic Hydrocarbon Base, NATO Code H-537
MIL-DTL-83133, Turbine Fuel, Aviation, Kerosene Type, NATO F-34 (JP-8)
MIL-PRF-23699, Lubricating Oil, Aircraft Turbine Engine Synthetic Base, Class STD, NATO Code 0-156 (NSN: 9150-01-6322-056)

### 3.6. Integrated Logistics Support (ILS).

#### 3.6.1. Aviation Unit Maintenance (AVUM).

The ACE, at the Line Replaceable Unit (LRU) (see 6.5) level, shall be fully maintainable at the unit level [Aviation Unit Maintenance (AVUM)] as defined in AR 750-1. The unit level maintenance functions shall include, but are not limited to: cleaning, inspection, adjustment, fitting, alignment, reconfiguration, functional checkout, and repair consisting of LRU and limited piece part replacement. Note: Aviation Life Support Equipment (ALSE) inspection cycle is 180 days.

### 3.6.2. Time to reconfigure.

The ACE shall be reconfigurable for each configuration delineated in Appendix A (substituting ACE components for those denoted in red text) within 30 minutes.

## 3.7. Human Systems Integration (HSI).

### 3.7.1. Human factors engineering.

#### 3.7.1.1. Freedom of movement.

The ACE shall not prevent mobility of aircrew members when performing freedom-of-movement tasks delineated in TABLE IV.

TABLE IV. *Freedom of movement tasks.*

Movement	Procedure
Standing Trunk Flexion	While standing with feet shoulder-width apart on a bench, a subject is asked to touch the floor at a point just in front of the feet. The distance between the fingertips and the floor is measured. Additionally, the angle of the hip is measured.
Sitting Trunk Flexion	While sitting in a straight-backed chair, a subject is asked to bend at the waist as far forward as possible. The distance between the fingertips and the floor is measured.
Upper Arm Abduction-Sitting	A subject is asked to raise his arms sideward and upward as far as possible while in a sitting position. A goniometer mounted on the back of the upper forearm measures the amount of abduction.
Upper Arm Forward Extension – Sitting	A subject raises their arms as far forward and upwards as possible while in a sitting position. A goniometer mounted on the side of the upper forearm measures the degree of extension.
Upper Arm Backward Extension – Sitting	While sitting and with the palm facing away from the body, a subject is asked to raise the arm as far backwards and upwards as possible. The measurement is the angle of backward extension, recorded from a goniometer mounted on the side of the upper forearm. The subject will be situated so the chair does not impede arm movement.
Upper Arm Forward Cross Body Extension – Sitting	While sitting in a straight-backed chair, a subject raises their arm straight out to the side, parallel to the floor, with the palm facing the floor. The subject moves their arm across the front of the body, as far as possible. The goniometer is mounted on the top of the shoulder socket and set to “0” degrees when the arm is straight out to the side (in plane with the body). The measurement is recorded when the arm has moved as far across the body as possible.

#### 3.7.1.2. Mission compatibility.

3.7.1.2.1. The ACE shall not prevent aircrew members from use of nor hinder operation of flight controls, displays and switches, and performance of mission-related duties.

3.7.1.2.2. The ACE shall not cause snagging or interference during emergency egress of the aircraft that would prevent an aircrew member from egressing on land within 30 seconds.

3.7.1.2.3. The ACE shall not impede the ability of aircrew members to ingress and egress from the aircraft in routine operations.

3.7.1.2.4. The ACE shall not cause snagging or interference with any required mission maneuver, equipment, or aircraft component.

#### 3.7.1.3. Unassisted donning/doffing.

3.7.1.3.1. Subsequent to initial rigging, ACE components shall be able to be donned unassisted (beginning with equipment on the ground and ending with equipment fully donned) within one minute [T], 30 seconds [O] by aircrew members.

3.7.1.3.2. All ACE components shall be able to be doffed by unassisted aircrew members.

3.7.1.4. Sensory acuity.

3.7.1.4.1. The ACE shall allow auditory sensory acuity adequate to effectively perform all mission-related tasks.

3.7.1.4.2. The ACE shall allow tactile sensory acuity adequate to effectively perform all mission-related tasks.

3.7.1.4.3. The ACE shall allow visual sensory acuity adequate to effectively perform all mission-related tasks.

3.7.1.5. Tactile identification.

The ACE shall enable tactile identification of any actuators, controls, latches, and switches under degraded visual conditions through location, shape, size, and mode of operation IAW MIL-STD-1472.

3.7.2. Soldier survivability.

3.7.2.1. Medical access.

The ACE shall enable medical access to the torso of a wounded aircrew member for the purpose of assessing and treating injuries.

3.7.2.2. Reconnect torso protection.

As an objective [O], the ACE shall have a means to securely reconnect torso protective equipment after medical access within 60 seconds.

3.8. Reliability and Maintainability (R&M).

3.8.1. Mean Time To Repair (MTTR).

The MTTR (see 6.5) shall not exceed 0.5 hours.

3.8.2. Maintenance Ratio (MR).

Maintenance Ratio (MR) (see 6.5) shall not exceed 0.059 maintenance man-hours per operating hour. Operating time is the time that an ACE is worn by aircrew members. Maintenance chargeability includes all events attributed to maintenance errors that are not rooted in inadequate training or poorly written manuals. Damage to items attributed to enemy action or operation outside routine or intended usage is excluded from the above requirements.

#### 4. VERIFICATION.

##### 4.0 General.

This section establishes the guidelines for the verification of requirements identified in Section 3.0. Requirements for which an aircraft test or demonstration is specified shall be verified on the following aircraft: H-64 series (Attack), H-72 series and H-60 series (MEDEVAC (see 6.5) and Utility), H-47 series (Cargo) and selected fixed-wing aircraft.

##### 4.0.1 Verification methods.

Inspection methods used to complete the verification process shall be limited to those described in TABLE V.

TABLE V. *Verification methods.*

Method	Description
Examination	An investigation, without the use of special laboratory appliances or procedures, of items to determine conformance to those specified requirements which can be determined by such investigations. Examination is generally nondestructive, and typically includes the use of sight, hearing, smell, touch, and taste; simple physical manipulation; mechanical and electrical gauging and measurement; and other forms of investigation.
Demonstration	Observable functional operation, under controlled conditions not requiring subsequent analysis of data, is used to verify that a given requirement is met.
Analysis	Involves a technical evaluation of design information such as equations, charts, graphs, drawings, schematics, and other data. If actual tests were conducted for a related or unrelated purpose, and utilization of these data will prove that requirement has been met, it should be considered "analysis". Analysis methods include the use of modeling and simulation with a government-accredited model.
Test	Involves observation or recording of data during operation of an item. Where "test" is the designated verification method, it is understood that some degree of analysis is inherent in the verification process and need not be so identified on the verification compliance matrix (TABLE VII).

##### 4.0.2. Verification criteria.

This section establishes the verification requirements for the ACE.

- a. Verification shall be performed on all new and modified components.
- b. Air Warrior legacy equipment is exempt from verification.
- c. Verifications shall utilize Appendix A for equipment configurations.

##### 4.1. ACE performance.

Verification of 3.1 shall be by examination that all the delineated components are present.

##### 4.1.1. Individual ballistic protection.

##### 4.1.1.1. ACE ballistic protection components.

Verification of 3.1.1.1 shall be by examination that the delineated components are present.

##### 4.1.1.1.1. Small arms and fragmentation protection.

Verification of 3.1.1.1.1 shall be by demonstration that each size SABI listed in TABLE I fits into the ACE of the same size.

4.1.1.1.2. Vital torso protection.

Verification of 3.1.1.1.2 shall be by demonstration that each size ESAPI listed in TABLE II fits into the ACE of the same size.

4.1.1.2. Location of ballistic protection components.

4.1.1.2.1. Verification of 3.1.1.2.1 shall be by demonstration with aircrew members.

4.1.1.2.2. Verification of 3.1.1.2.2 shall be by demonstration with aircrew members.

4.1.1.2.3. Verification of 3.1.1.2.3 shall be by examination.

4.1.1.2.4. Verification of 3.1.1.2.4 shall be by demonstration with aircrew members.

4.1.1.2.5. Verification of 3.1.1.2.5 shall be by demonstration with aircrew members.

4.1.1.3. Tailorability.

Verification of 3.1.1.3 shall be by demonstration.

4.1.1.4. ESAPI ejection.

4.1.1.4.1. Verification of 3.1.1.4.1 shall be by demonstration with aircrew members.

4.1.1.4.2. Verification of 3.1.1.4.2 shall be by demonstration in conjunction with the in-water verification of 3.1.4.3.6.

4.1.2. Extraction & retrieval, in-cabin restraint, and insertion.

4.1.2.1. Emergency extraction by hoist.

4.1.2.1.1. Extraction components.

Verification of 3.1.2.1.1 shall be by examination that all the delineated components are present.

4.1.2.1.2. Extraction interfaces.

- a. Verification of 3.1.2.1.2.a. shall be by demonstration in an aircraft environment.
- b. Verification of 3.1.2.1.2.b. shall be by demonstration in conjunction with the verification of 3.1.2.1.3.d. while seated in a hoist for 15 minutes.
- c. Verification of 3.1.2.1.2.c. shall be by demonstration in conjunction with the verification of 3.1.2.1.3.d. while seated in a hoist for 15 minutes.
- d. Verification of 3.1.2.1.2.d. shall be by demonstration in a water environment.

4.1.2.1.3. Extraction constraints.

- a. Verification of 3.1.2.1.3.a. shall be by examination.
- b. Verification of 3.1.2.1.3.b. shall be by demonstration in conjunction with the verification of 3.1.2.1.3.d. while seated in a hoist for 15 minutes.
- c. Verification of 3.1.2.1.3.c. shall be by demonstration in a water environment.
- d. Verification of 3.1.2.1.3.d. shall be by demonstration.

4.1.2.2. External attachment to the fuselage.

4.1.2.2.1. External attachment components.

Verification of 3.1.2.2.1 shall be by examination that all the delineated components are present.

4.1.2.2.2. External attachment interfaces.

Verification of 3.1.2.2.2 shall be by demonstration on a static H-64 series helicopter.

4.1.2.3. In-cabin safety restraint.

4.1.2.3.1. In-cabin safety restraint components.

Verification of 3.1.2.3.1 shall be by examination that all the delineated components are present.

4.1.2.3.2. In-cabin safety restraint interfaces.

Verification of 3.1.2.3.2 shall be by demonstration in an aircraft environment.

4.1.2.3.3. In-cabin safety restraint constraints.

Verification of 3.1.2.3.3 shall be by demonstration.

4.1.2.4. Repetitive MEDEVAC insertion and retrieval.

4.1.2.4.1. Insertion components.

Verification of 3.1.2.4.1 shall be by examination that all the delineated components are present.

4.1.2.4.2. Insertion constraints.

4.1.2.4.2.1. Verification of 3.1.2.4.2.1 shall be by demonstration by Army medics.

4.1.2.4.2.2. Verification of 3.1.2.4.2.2 shall be by demonstration by Army medics.

4.1.2.5. Full-body harness.

Note: Verifications in this section are in part adapted from ANSI/ASSE Z359.11-2014.

4.1.2.5.1. Full-body harness physical characteristics.

4.1.2.5.1.1. Verification of 3.1.2.5.1.1 shall be by examination that all the delineated components are present.

a. Verification of 3.1.2.5.1.1.a shall be by demonstration.

b. Verification of 3.1.2.5.1.1.b shall be by demonstration.

4.1.2.5.1.2. Verification of 3.1.2.5.1.2 shall be by examination.

4.1.2.5.1.3. Verification of 3.1.2.5.1.3 shall be by examination.

4.1.2.5.1.4. Verification of 3.1.2.5.1.4 shall be by examination.

4.1.2.5.1.5. Verification of 3.1.2.5.1.5 shall be by test in conjunction with the verification of 3.1.2.5.2.3. During the inspection included in the verification paragraph 4.1.2.5.2.3 which occurs after exposure for 60 seconds at 3600 lbf, the visual inspection shall ensure that at least one fall arrest indicator is deployed. Inspection of the load charts shall be used to determine the average load at which the fall arrest indicator deployed and that this average is in the range required by 3.1.2.5.1.5.

4.1.2.5.1.6. Verification of 3.1.2.5.1.6 shall be by test in conjunction with the verification of 3.1.2.5.2.5. During the inspection included in the verification paragraph 4.1.2.5.2.5 which occurs after exposure for 60 seconds at 3600 lbf, the visual inspection shall ensure that at least one fall arrest indicator is deployed. Inspection of the load charts shall be used to determine the average load at which the fall arrest indicator deployed and that this average is in the range required by 3.1.2.5.1.6.

4.1.2.5.1.7. Verification of 3.1.2.5.1.7 shall be by examination.

4.1.2.5.1.8. Verification of 3.1.2.5.1.8 shall be by examination.

4.1.2.5.1.9. Verification of 3.1.2.5.1.9 shall be by analysis.

4.1.2.5.2. Full-body harness performance characteristics.

4.1.2.5.2.1. Verification of 3.1.2.5.2.1 shall be by a Dynamic Feet-First Fall test. The FBH (see 3.1.2.5) shall be subjected to a dynamic feet-first fall using the dorsal attachment element. The FBH shall be installed on a Humanetics Torso Dummy Model 131-001 rigid torso-shaped test fixture (see 6.10) that weighs  $300 \pm 3$  lbs. The load shall be induced by a drop of no less than eight feet vertical distance. The maximum arrest force shall be recorded. The FBH shall be inspected after the fall is complete for compliance to 3.1.2.5.2.1.

4.1.2.5.2.2. Verification of 3.1.2.5.2.2 shall be by a Dynamic Head-First Fall test. The FBH (see 3.1.2.5) shall be subjected to a dynamic head-first fall using the dorsal attachment element. The FBH shall be installed on a Humanetics Torso Dummy Model 131-001 rigid torso-shaped test fixture (see 6.10) that weighs  $300 \pm 3$  lbs. The load shall be induced by a drop of no less than eight feet vertical distance. The maximum arrest force shall be recorded. The FBH shall be inspected after the fall is complete for compliance to 3.1.2.5.2.2.

4.1.2.5.2.3. Verification of 3.1.2.5.2.3 static load shall be by test. The FBH (see 3.1.2.5) shall be subjected to a static load using the dorsal attachment element. The FBH shall be installed on a Humanetics Torso Dummy Model 131-001 rigid torso-shaped test fixture (see 6.10). The torso fixture shall be mounted into a static test fixture. The load application rate shall not introduce a dynamic effect. Once the applied load reaches 3,600 lbf minimum, the load shall be maintained for no less than 60 seconds. After the 60 seconds is complete, the load shall be removed and the FBH shall be inspected for compliance to the requirements of 3.1.2.5.2.3.

4.1.2.5.2.4. Verification of 3.1.2.5.2.4 shall be by a Dynamic Feet-First Fall test. The FBH (see 3.1.2.5) shall be subjected to a dynamic feet-first fall using the sternal attachment element. The FBH shall be installed on a Humanetics Torso Dummy Model 131-001 rigid torso-shaped test fixture (see 6.10) that weighs  $300 \pm 3$  lbs. The load shall be induced by a drop of no less than four feet vertical distance. The maximum arrest force shall be recorded. The FBH shall be inspected after the fall is complete for compliance to 3.1.2.5.2.4.

4.1.2.5.2.5. Verification of 3.1.2.5.2.5 static load shall be by test. The FBH (see 3.1.2.5) shall be subjected to a static load using the sternal attachment element. The FBH shall be installed on a Humanetics Torso Dummy Model 131-001 rigid torso-shaped test fixture (see 6.10). The torso fixture shall be mounted into a static test fixture. The load application rate shall not introduce a dynamic effect. The application of load shall be interrupted and held for 60 seconds at 800 lbf. After the 60 seconds at 800 lbf is complete, a visual inspection shall be conducted IAW the requirements of 3.1.2.5.2.5. The load application shall be resumed. Once the applied load reaches 3,600 lbf minimum, the load shall be maintained for no less than 60 seconds. After the 60 seconds is complete, the load shall be removed and the FBH shall be inspected for compliance to the requirements of 3.1.2.5.2.5.

4.1.2.5.3. Full-body harness material characteristics.

4.1.2.5.3.1. Load-bearing straps.

- a. Verification of 3.1.2.5.3.1.a shall be by examination.
- b. Verification of 3.1.2.5.3.1.b shall be by examination.
- c. Verification of 3.1.2.5.3.1.c shall be by examination.
- d. Verification of 3.1.2.5.3.1.d shall be by examination.
- e. Verification of 3.1.2.5.3.1.e shall be by examination.

4.1.2.5.3.2. Thread and stitching.

- a. Verification of 3.1.2.5.3.2.a shall be by examination.
- b. Verification of 3.1.2.5.3.2.b shall be by examination.
- c. Verification of 3.1.2.5.3.2.c shall be by examination.

4.1.2.5.4. Connecting hardware.

- a. Verification of 3.1.2.5.4.a shall be by examination.
- b. Verification of 3.1.2.5.4.b shall be by examination.
- c. Verification of 3.1.2.5.4.c shall be by test (ref. ANSI/ASSP Z359.12-2019). D-Rings, O-Rings and Oval Rings shall be subjected to a tensile load of 5,000 lbs. The time to reach the test load shall be greater than one minute in order to avoid dynamic effects. The test load shall be maintained for a minimum period of one minute. Then the load shall be released. The hardware shall be removed from the test fixture and evaluated. Alternatively, permanent marking on the hardware signifying that compliance is certified by a governing body to 22 kN (5000 lbf) tensile load or greater shall be acceptable by examination.
- d. Verification of 3.1.2.5.4.d shall be by test (ref. ANSI/ASSP Z359.12-2019). Buckles, and adjuster hardware shall be subjected to a tensile load of 3,372 lbs. The time to reach the test load shall be greater than one minute in order to avoid dynamic effects. The test load shall be maintained for a minimum period of one minute. Then the load shall be released. The hardware shall be removed from the test fixture and evaluated. Alternatively, permanent marking on the hardware signifying that compliance is certified by a governing body to 15 kN (3372 lbf) tensile load or greater shall be acceptable by examination.
- e. Snaphooks and carabiners.
  - i. Verification of 3.1.2.5.4.e.i shall be by demonstration with aircrew members.
  - ii. Verification of 3.1.2.5.4.e.ii shall be by demonstration.
  - iii. Verification of 3.1.2.5.4.e.iii shall be by demonstration with aircrew members.
  - iv. Verification of 3.1.2.5.4.e.iv shall be by test (ref. ANSI/ASSP Z359.12-2019). A test load of 5,000 lb shall be applied to the snaphook or carabiner body between its two bearing points. The time to reach the force shall be greater than one minute in order to avoid dynamic effects. The test force shall be maintained for a minimum period of one minute. The hardware shall be removed from the test fixture and evaluated. Alternatively, permanent marking on the hardware signifying that compliance is certified by a governing body to 22 kN (5000 lbf) tensile load or greater shall be acceptable by examination.
  - v. Verification of 3.1.2.5.4.e.v shall be by test (ref. ANSI/ASSP Z359.12-2019). The hardware shall be positioned in a tensile tester clamping fixture such that the inside face of the gate is generally parallel to the test bed and the gate's motion is perpendicular to the test bed. Notches may be used in the carabiner back and gate to prevent pin slippage. The test load shall be applied at a constant rate not greater than 3 inches/minute until the required test load of 3,600 lb is reached. The test force shall be maintained for a minimum

period of one minute. The hardware shall be removed from the test fixture and evaluated. Alternatively, permanent marking on the hardware signifying that compliance is certified by a governing body to 16 kN (3600 lbf) minor axis tensile load shall be acceptable by examination.

#### 4.1.3. Equipment carriage.

##### 4.1.3.1. Mission equipment interfaces.

4.1.3.1.1. Verification of 3.1.3.1.1 shall be by demonstration that each component can be stowed in or on the ACE.

4.1.3.1.2. Verification of 3.1.3.1.2 shall be by demonstration in an aircraft environment and in a water environment.

##### 4.1.3.2. Loss-prevention component.

Verification of 3.1.3.2 shall be by examination.

##### 4.1.3.3. Statically located equipment.

4.1.3.3.1. Verification of 3.1.3.3.1 shall be by examination.

4.1.3.3.2. Verification of 3.1.3.3.2 shall be by demonstration.

4.1.3.3.3. Verification of 3.1.3.3.3 shall be by demonstration with aircrew members.

4.1.3.3.4. Verification of 3.1.3.3.4 shall be by demonstration with aircrew members.

##### 4.1.3.4. Holster for the defensive weapon.

4.1.3.4.1. Verification of 3.1.3.4.1 shall be by examination.

4.1.3.4.2. Verification of 3.1.3.4.2 shall be by demonstration.

4.1.3.4.3. Verification of 3.1.3.4.3 shall be by demonstration in an aircraft environment.

#### 4.1.4. Flotation.

##### 4.1.4.1. Flotation performance.

###### 4.1.4.1.1. Integral flotation component.

Verification of 3.1.4.1.1 shall be by examination all the delineated components are present.

###### 4.1.4.1.2. Primary and contingency cells.

Verification of 3.1.4.1.2 shall be by examination.

###### 4.1.4.1.3. Helmet compatibility.

Verification of 3.1.4.1.3 shall be by examination.

###### 4.1.4.1.4. Buoyancy.

Verification of 3.1.4.1.4 shall be by demonstration. The inflated flotation device bladder(s) shall be attached to a weight equal to the required buoyancy, and placed in clean, fresh water having a temperature of  $73 \pm 5$  °F.

###### 4.1.4.1.5. Removable bladder.

Verification of 3.1.4.1.5 shall be by demonstration.

###### 4.1.4.1.6. Pressure.

Verification of 3.1.4.1.6 shall be by test. The CO2 cylinders and manual inflators shall be removed for the test. A source of pressurized air shall be connected to both bladder chambers and the bladder shall be inflated to  $5.0 \pm 0.1$  psig, at which time the air source shall be securely shut off. After a minimum of 10 minutes the bladder pressure shall be checked and, if necessary, raised back to  $5.0 \pm 0.1$  psig. Pressure shall be maintained for an additional 20 (+5/-0) minutes. At 10 (+3/-0) minutes after the second pressure adjustment, the bladder pressure shall not have dropped below 4.5 psig. After the test is completed, the bladder shall be inspected for folding and puckering while it is inflated. Then it shall be deflated to inspect seams and construction materials.

4.1.4.1.7. Fatigue.

Verification of 3.1.4.1.7 shall be by test. A source of pressurized air shall be connected to both bladder chambers and they shall be inflated to 5.0 (+ 0.3/-0) psig, held at this pressure for at least 15 seconds, and then deflated. This inflation/deflation cycle shall be repeated three more times for a total of four cycles. During the fourth (last) cycle, the pressure shall be held for at least 30 seconds and then checked. The pressure shall not have dropped below 3.5 psig. After the test is completed, the bladder shall be inspected for folding and puckering while it is inflated. Then it shall be deflated to inspect seams and construction materials.

4.1.4.1.8. Leakage.

Verification of 3.1.4.1.8 shall be by test. A source of pressurized air shall be connected to both bladder chambers and inflated to 2.0 (+ 0.3/-0) psig, at which time the air source shall be securely shut off. After not less than 15 minutes, the pressure shall be checked and, if necessary, readjusted to 2.0 psig. The temperature and pressure shall be recorded at this time. After a minimum of 4 hours has elapsed since the readjustment period, the bladder pressure shall be checked. The final temperature and pressure shall be recorded and evaluated IAW the pressure requirement of 3.1.4.1.8. After the test is completed, the bladder shall be deflated to inspect seams and construction materials.

4.1.4.1.9. Burst.

Verification of 3.1.4.1.9 shall be by test. The carbon dioxide cylinders shall be removed during this inspection. A source of pressurized air shall be connected to both bladder chambers and the bladders shall be inflated at a rate of approximately 0.25 psig per minute until the bladder bursts. If 15 psig is reached without bursting, the test can be terminated and considered a success.

4.1.4.2. Flotation physical characteristics.

4.1.4.2.1. Manual actuation.

Verification of 3.1.4.2.1 shall be by examination of the actuator type.

4.1.4.2.2. Single-action actuation.

Verification of 3.1.4.2.2 shall be by demonstration in a water environment.

4.1.4.2.3. Oral inflation tubes.

Verification of 3.1.4.2.3 shall be by demonstration in a water environment.

4.1.4.2.4. Locking oral inflation tubes.

Verification of 3.1.4.2.4 shall be by demonstration.

4.1.4.2.5. Gas evacuation aid.

Verification of 3.1.4.2.5 shall be by demonstration of the complete evacuation of gas from the bladder.

4.1.4.2.6. Abrasion protection.

Verification of 3.1.4.2.6 shall be by examination.

4.1.4.2.7. Shelf and service life record.

Verification of 3.1.4.2.7 shall be by examination.

4.1.4.3. In-water performance.

(All of the verifications in this section shall be demonstrated in a water environment.)

4.1.4.3.1. Auto-righting, conscious.

Verification of 3.1.4.3.1 shall be by demonstration.

4.1.4.3.2. Auto-righting, unresponsive.

Verification of 3.1.4.3.2 shall be by demonstration.

4.1.4.3.3. Auto-righting, partial inflation.

Verification of 3.1.4.3.3 shall be by demonstration [O].

4.1.4.3.4. Freeboard.

Verification of 3.1.4.3.4 shall be by demonstration.

4.1.4.3.5. One-handed access and operation (immersed).

Verification of 3.1.4.3.5 shall be by demonstration.

4.1.4.3.6. Water survival mobility.

Verification of 3.1.4.3.6 shall be by demonstration.

4.1.4.3.7. Neutral buoyancy.

Verification of 3.1.4.3.7 shall be by demonstration [O].

4.1.5. Drag handle.

Verification of 3.1.5 shall be by demonstration with aircrew members. A dummy weight may be used to represent the non-responsive aircrew member.

4.2. ACE Physical characteristics.

4.2.1. Weight and bulk reduction.

4.2.1.1. Weight reduction.

Verification of 3.2.1.1 shall be by examination.

4.2.1.2. Bulk reduction.

Verification of 3.2.1.2 shall be by examination.

4.2.2. Low luster.

Verification of 3.2.2 shall be by examination.

4.2.3. Dissimilar metals.

Verification of 3.2.3 shall be by examination.

4.2.4. Tailorability.

Verification of 3.2.4 shall be by demonstration. This demonstration may be conducted in conjunction with any verification occurring in an aircraft environment.

4.2.5. Anthropometric sizing.

4.2.5.1. Size distribution.

Verification of 3.2.5.1 shall be by examination.

4.2.5.2. Basis of issue.

Verification of 3.2.5.2 shall be by demonstration with aircrew members.

4.2.6. Signature protection.

4.2.6.1. Visual protection.

Verification of 3.2.6.1 shall be by test using AATCC Evaluation Procedure 9, Option A or C, Magnitude Evaluation method.

4.2.6.2. Infrared protection.

Verification of 3.2.6.2 shall be by test. Spectral reflectance data shall be determined on the face side and shall be obtained from 600 to 860 nanometers (nm) at 20 nm intervals on a spectrophotometer relative to the barium sulfate standard, the preferred white standard. Other white reference materials may be used provided they are calibrated to absolute white, e.g. magnesium oxide or vitrolite tiles. The spectral band width shall be less than 26 nm at 860 nm. Reflectance measurements shall be made by either the monochromatic or polychromatic mode of operation. When the polychromatic mode is used, the spectrophotometer shall operate with the specimen diffusely illuminated with the full emission of a continuous source that simulates either Commission Internationale de l'Éclairage (International Commission on Illumination) (CIE) standard illuminant A or

CIE standard illuminant D65. Measurements shall be taken on a minimum of two different areas and the data averaged. Specimens shall be viewed at an angle no greater than 10 degrees from the normal, with the specular component included. Specimens shall be oriented in different directions during testing. When possible, the specimens tested shall not contain the same yarns when presented to the sample port. Photometric accuracy of the spectrophotometer shall be within 1 percent and wavelength accuracy within 2 nm. The diameter for standard aperture size used in the color measurement device shall be 1.0 to 1.25 inches or largest possible aperture size.

4.2.6.3. Aural protection.

Verification of 3.2.6.3 shall be by demonstration in a field environment.

4.2.6.4. Light signature protection.

Verification of 3.2.6.4 shall be by examination.

4.2.7. Labeling.

Verification of 3.2.7 shall be by analysis, addressing procedures and hazards and compliance with the recommendations of MIL-STD-1472. Supporting test requirements within this standard that are determined to apply shall be performed and shall meet the requirements therein.

4.2.8. Water drainage.

Verification of 3.2.8 shall be by demonstration in conjunction with the verification of 3.5.6, and in a water environment.

4.3. Interfaces.

4.3.1. ACE to clothing and equipment interfaces.

4.3.1.1. Thermal Layered Clothing.

4.3.1.1.1. Verification of 3.3.1.1.1 shall be by demonstration with aircrew members.

4.3.1.1.2. Verification of 3.3.1.1.2 shall be by demonstration with aircrew members.

4.3.1.2. Over Water Equipment.

4.3.1.2.1. Verification of 3.3.1.2.1 shall be by demonstration with aircrew members.

4.3.1.2.2. Verification of 3.3.1.2.2 shall be by demonstration with aircrew members.

4.3.1.3. Chemical/Biological (CB) Ensemble.

4.3.1.3.1. Verification of 3.3.1.3.1 shall be by demonstration with aircrew members.

4.3.1.3.2. Verification of 3.3.1.3.2 shall be by demonstration with aircrew members.

4.3.1.4. Helmet.

4.3.1.4.1. Verification of 3.3.1.4.1 shall be by demonstration in an aircraft environment.

4.3.1.4.2. Verification of 3.3.1.4.2 shall be by demonstration in an aircraft environment.

4.3.1.4.3. Verification of 3.3.1.4.3 shall be by demonstration in an aircraft environment.

4.3.2. ACE to aircraft interfaces.

4.3.2.1. Verification of 3.3.2.1 shall be by demonstration in an aircraft environment.

4.3.2.2. Verification of 3.3.2.2 shall be by demonstration in an aircraft environment.

4.3.2.3. Verification of 3.3.2.3 shall be by demonstration in an aircraft environment.

4.4. Fabric properties and finishes.

4.4.1. Cleaning/laundrying.

Verification of 3.4.1 shall be by demonstration of the cleaning method proposed for the ACE.

4.4.2. Flash fire protection.

4.4.2.1. Verification of 3.4.2.1 shall be by test in a laboratory environment IAW ASTM F1930 at a four second exposure with a predicted injury due to combined 2nd and 3rd degree burns on no greater than 20 percent of the body surface area, excluding the head.

4.4.2.2. Verification of 3.4.2.2 shall be by test in a laboratory environment IAW ASTM F1930 at a four second exposure.

#### 4.4.3. Water repellency.

Verification of 3.4.3 shall be by test IAW AATCC Test Method (TM) 22 (Water Repellency: Spray Test) using three test specimens in new condition and three test specimens in laundered condition. Laundry preconditioning shall be IAW AATCC TM 135 (Dimensional Changes of Fabrics after Home Laundering) except that fabric weight and dimensional measurement records may be omitted. Select and record ASTM TM 135 drying method used for preconditioning to most closely match fabric manufacturer's care instructions. Spray Rating (TM 22) for the three new samples shall be no less than 100, 100, 90 and shall for the three laundered samples shall be no less than 90, 90, 80.

#### 4.4.4. Non-corrosive finishes.

Verification of 3.4.4 shall be by analysis, identifying the primary components of any surface chemicals present on the ACE and their potential to react with or corrode brass hardware or other materials used in the system.

#### 4.4.5. Anti-static property.

Verification of 3.4.5 shall be by test IAW the requirements and procedures delineated in drawing 1005938.

### 4.5. Environmental performance.

#### 4.5.1. High-temperature storage.

Verification of 3.5.1 shall be by test in a laboratory environment IAW MIL-STD-810, Method 501.7, Procedure I but using the Diurnal cycle, TABLE VI herein for seven cycles (168 hours) of exposure to the hot-induced conditions. Post-tests, functional and visual assessments shall be made following completion of the high-temperature exposure. After exposure, any operational hardware shall be opened and closed three times to ensure that there is no binding of mechanical components. Flotation component shall be actuated to ensure functionality.

TABLE VI. *Diurnal cycle.*

Time of Day	Temperature °C      °F		Time of Day	Temperature °C      °F		Time of Day	Temperature °C      °F	
0100	36	96	0900	48	118	1700	80	175
0200	34	94	1000	58	136	1800	74	165
0300	34	94	1100	64	148	1900	63	146
0400	33	91	1200	74	165	2000	54	128
0500	33	91	1300	82	180	2100	44	111
0600	33	91	1400	84	183	2200	41	106
0700	37	99	1500	85	185	2300	38	101
0800	43	109	1600	84	183	2400	36	96

#### 4.5.2. Low-temperature storage.

Verification of 3.5.2 shall be by test in a laboratory environment IAW MIL-STD-810, Method 502.7, Procedure I with exposure to -80°F (+0/-5) for 72 hours. Post-tests, functional and visual assessments shall be made following completion of the low-temperature exposure. After exposure, operational hardware shall be opened and closed three times to ensure that there is no binding of mechanical components. Flotation component shall be actuated to ensure functionality.

#### 4.5.3. Humidity.

Verification of 3.5.3 shall be by test in a laboratory environment IAW MIL-STD-810, Method 507.6, Procedure 1 with temperature range from 86°F to 140°F, with a relative humidity of 95% (±4%) for a minimum of ten 24-hour cycles. Functional and visual assessments shall be made following completion of the humidity exposure. After exposure, operational hardware shall be

opened and closed three times to ensure that there is no binding of mechanical components. Flotation component shall be actuated to ensure functionality.

#### 4.5.4. Fungus.

Verification of 3.5.4 shall be by test in a laboratory environment IAW MIL-STD-810, Method 508.8-I for 28 days. Exposure shall include the five species listed in MIL-STD-810, Table 508.8-I in a mixed spore suspension. Functional assessment shall be made following completing of the fungal exposure. After exposure, operational hardware shall be opened and closed three times to ensure that there is no binding of mechanical components.

#### 4.5.5. Salt fog.

Verification of 3.5.5 shall be by test in a laboratory environment IAW MIL-STD-810, Method 509.7, using concentrations of 5 ( $\pm 1$ ) % NaCl solution with a specific gravity of 1.027 to 1.034 performing at least two cycles, with each cycle consisting of a 24-hour exposure to the salt fog environment, followed by a 24-hour dry time. Functional and visual assessments shall be made following completion of the salt fog exposure. Red rust deposits are not allowed, but white scale that does not affect function is permissible. After exposure, operational hardware shall be opened and closed three times to ensure that there is no binding of mechanical components.

#### 4.5.6. Rain.

Verification of 3.5.6 shall be by test in a laboratory environment IAW MIL-STD-810, Method 506.6, Procedure I with a test duration of 30 minutes per vulnerable face, using a blowing rain rate of 4 in/hr (1.7 mm/min) at the air velocity of 40 mph. Functional and visual assessments shall be made following completion of the rain exposure. Red rust deposits are not allowed, but white scale that does not affect function is permissible. After exposure, operational hardware shall be opened and closed three times to ensure that there is no binding of mechanical components.

#### 4.5.7. Blowing dust.

Verification of 3.5.7 shall be by test in a laboratory environment IAW MIL-STD-810, Method 510.7, Procedure I using blowing dust particles with diameter less than 0.15 mm with dust concentration of 10.6 ( $\pm 7$ ) g/m<sup>3</sup> at the minimum air velocity of 8.9 ( $\pm 1.3$ ) meters/second for duration of six hours at ambient temperature followed immediately by six hours at 125°F. Functional assessment shall be made following completion of the sand and dust exposure. After removal of particulate with a soft brush, operational hardware shall be opened and closed three times to ensure that there is no clogging or binding of mechanical components. Flotation component shall be actuated to ensure functionality.

#### 4.5.8. Blowing sand.

Verification of 3.5.8 shall be by test in a laboratory environment IAW MIL-STD-810, Method 510.7, Procedure II using sand particles ranging from 0.15 mm to 0.85 mm with the sand concentration of 2.2 ( $\pm 0.5$ ) g/m<sup>3</sup>, at the minimum air velocity of 18 meters/second for a duration of 90 minutes at each face of each item at 125°F. Functional assessment shall be made following completion of the sand exposure. After removal of particulate with a soft brush, operational hardware shall be opened and closed three times to ensure that there is no clogging or binding of mechanical components. Flotation component shall be actuated to ensure functionality.

#### 4.5.9. Fluid contamination.

Verification of 3.5.9 shall be by test in a laboratory environment IAW MIL-STD-810, Method 504.3, Intermittent Contamination using spray method for application of contaminant. Fluid contaminants may be removed prior to post tests by blotting or by use of a cleaning solvent. Functional assessment shall be made following completion of the fluid contaminant exposure. After exposure, operational hardware shall be opened and closed three times to ensure that there is no clogging or binding of mechanical components. Flotation component shall be actuated to ensure functionality.

### 4.6. Integrated Logistics Support (ILS).

#### 4.6.1. Aviation Unit Maintenance (AVUM).

Verification of 3.6.1 shall be by analysis of the ACE maintenance concept ensuring that the ACE can be maintained at the AVUM level.

4.6.2. Time to reconfigure.

Verification of 3.6.2 shall be by demonstration.

4.7. Human Systems Integration (HSI).

4.7.1. Human factors engineering.

4.7.1.1. Freedom of movement.

Verification of 3.7.1.1 shall be verified by demonstration with aircrew members.

Subjects shall perform no less than three repetitions of each freedom of movement task (see TABLE IV) in each of the Appendix A configurations.

4.7.1.2. Mission compatibility.

4.7.1.2.1. Verification of 3.7.1.2.1 shall be by demonstration in an aircraft environment.

4.7.1.2.2. Verification of 3.7.1.2.2 shall be by demonstration in an aircraft environment.

4.7.1.2.3. Verification of 3.7.1.2.3 shall be by demonstration in an aircraft environment.

4.7.1.2.4. Verification of 3.7.1.2.4 shall be by demonstration in an aircraft environment.

4.7.1.3. Unassisted donning/doffing.

4.7.1.3.1. Verification of 3.7.1.3.1 shall be by demonstration with aircrew members.

4.7.1.3.2. Verification of 3.7.1.3.2 shall be by demonstration with aircrew members.

4.7.1.4. Sensory acuity.

4.7.1.4.1. Verification of 3.7.1.4.1 shall be by demonstration in an aircraft environment.

4.7.1.4.2. Verification of 3.7.1.4.2 shall be by demonstration in an aircraft environment.

4.7.1.4.3. Verification of 3.7.1.4.3 shall be by demonstration in an aircraft environment.

4.7.1.5. Tactile identification.

Verification of 3.7.1.5 shall be by demonstration on land with aircrew members, and in a water environment.

4.7.2. Soldier survivability.

4.7.2.1. Medical access.

Verification of 3.7.2.1 shall be by demonstration.

4.7.2.2. Reconnect torso protection.

Verification of the objective requirement 3.7.2.2 shall be by demonstration.

4.8. Reliability and Maintainability (R&M).

4.8.1. Mean Time To Repair (MTTR).

Verification of 3.8.1 shall be by demonstration.

4.8.2. Maintenance Ratio (MR).

Verification of 3.8.2 shall be by analysis.

TABLE VII. *Verification compliance matrix.*

Requirement Statement Section	Description	Method	Qualification	Verification Statement Section
3.0.	Requirements.			4.0.
3.1.	ACE performance.	Exam	X	4.1.
3.1.1.	Individual ballistic protection.			4.1.1.
3.1.1.1.	ACE ballistic protection components.	Exam	X	4.1.1.1.
3.1.1.1.1.	Small arms and fragmentation protection.	Demo	X	4.1.1.1.1.
3.1.1.1.2.	Vital torso protection.	Demo	X	4.1.1.1.2.
3.1.1.2.	Location of ballistic protection components.			4.1.1.2.
3.1.1.2.1.	untitled	Demo	X	4.1.1.2.1.
3.1.1.2.2.	untitled	Demo	X	4.1.1.2.2.
3.1.1.2.3.	untitled	Exam	X	4.1.1.2.3.
3.1.1.2.4.	untitled	Demo	X	4.1.1.2.4.
3.1.1.2.5.	untitled	Demo	X	4.1.1.2.5.
3.1.1.3.	Tailorability.	Demo	X	4.1.1.3.
3.1.1.4.	ESAPI ejection.			4.1.1.4.
3.1.1.4.1.	untitled	Demo	X	4.1.1.4.1.
3.1.1.4.2.	untitled	Demo	X	4.1.1.4.2.
3.1.2.	Extraction & retrieval, in-cabin restraint, and insertion.			4.1.2.
3.1.2.1.	Emergency extraction by hoist.			4.1.2.1.
3.1.2.1.1.	Extraction components.	Exam	X	4.1.2.1.1.
3.1.2.1.2.	Extraction interfaces.			4.1.2.1.2.
3.1.2.1.2.a.	untitled	Demo	X	4.1.2.1.2.a.
3.1.2.1.2.b.	untitled	Demo	X	4.1.2.1.2.b.
3.1.2.1.2.c.	untitled	Demo	X	4.1.2.1.2.c.
3.1.2.1.2.d.	untitled	Demo	X	4.1.2.1.2.d.
3.1.2.1.3.	Extraction constraints.			4.1.2.1.3.
3.1.2.1.3.a.	untitled	Exam	X	4.1.2.1.3.a.
3.1.2.1.3.b.	untitled	Demo	X	4.1.2.1.3.b.
3.1.2.1.3.c.	untitled	Demo	X	4.1.2.1.3.c.
3.1.2.1.3.d.	untitled	Demo	X	4.1.2.1.3.d.
3.1.2.2	External attachment to the fuselage.			4.1.2.2.
3.1.2.2.1.	External attachment components.	Exam	X	4.1.2.2.1.
3.1.2.2.2.	External attachment interfaces.	Demo	X	4.1.2.2.2.
3.1.2.3.	In-cabin safety restraint.			4.1.2.3.
3.1.2.3.1.	In-cabin safety restraint components.	Exam	X	4.1.2.3.1.
3.1.2.3.2.	In-cabin safety restraint interfaces.	Demo	X	4.1.2.3.2.

Requirement Statement Section	Description	Method	Qualification	Verification Statement Section
3.1.2.3.3.	In-cabin safety restraint constraints.	Demo	X	4.1.2.3.3.
3.1.2.4.	Repetitive MEDEVAC insertion and retrieval.			4.1.2.4.
3.1.2.4.1.	Insertion components.	Exam	X	4.1.2.4.1.
3.1.2.4.2.	Insertion constraints.			4.1.2.4.2.
3.1.2.4.2.1.	untitled	Demo	X	4.1.2.4.2.1.
3.1.2.4.2.2.	untitled	Demo	X	4.1.2.4.2.2.
3.1.2.5.	Full-body harness.			4.1.2.5.
3.1.2.5.1.	Full-body harness physical characteristics.			4.1.2.5.1.
3.1.2.5.1.1.	untitled	Exam	X	4.1.2.5.1.1.
3.1.2.5.1.1.a.	untitled	Demo	X	4.1.2.5.1.1.a.
3.1.2.5.1.1.b.	untitled	Demo	X	4.1.2.5.1.1.b.
3.1.2.5.1.2.	untitled	Exam	X	4.1.2.5.1.2.
3.1.2.5.1.3.	untitled	Exam	X	4.1.2.5.1.3.
3.1.2.5.1.4.	untitled	Exam	X	4.1.2.5.1.4.
3.1.2.5.1.5.	untitled	Test	X	4.1.2.5.1.5.
3.1.2.5.1.6.	untitled	Test	X	4.1.2.5.1.6.
3.1.2.5.1.7.	untitled	Exam	X	4.1.2.5.1.7.
3.1.2.5.1.8.	untitled	Exam	X	4.1.2.5.1.8.
3.1.2.5.1.9.	untitled	Analysis	X	4.1.2.5.1.9.
3.1.2.5.2.	Full-body harness performance characteristics.			4.1.2.5.2.
3.1.2.5.2.1.	untitled	Test	X	4.1.2.5.2.1.
3.1.2.5.2.2.	untitled	Test	X	4.1.2.5.2.2.
3.1.2.5.2.3.	untitled	Test	X	4.1.2.5.2.3.
3.1.2.5.2.4.	untitled	Test	X	4.1.2.5.2.4.
3.1.2.5.2.5.	untitled	Test	X	4.1.2.5.2.5.
3.1.2.5.3.	Full-body harness material characteristics.			4.1.2.5.3.
0.	Load-bearing straps.			4.1.2.5.3.1.
0.a.	untitled	Exam	X	4.1.2.5.3.1.a.
0.b.	untitled	Exam	X	4.1.2.5.3.1.b.
0.c.	untitled	Exam	X	4.1.2.5.3.1.c.
0.d.	untitled	Exam	X	4.1.2.5.3.1.d.
0.e.	untitled	Exam	X	4.1.2.5.3.1.e.
3.1.2.5.3.2.	Thread and stitching.			4.1.2.5.3.2.
3.1.2.5.3.2.a.	untitled	Exam	X	4.1.2.5.3.2.a.
3.1.2.5.3.2.b.	untitled	Exam	X	4.1.2.5.3.2.b.
3.1.2.5.3.2.c.	untitled	Exam	X	4.1.2.5.3.2.c.

Requirement Statement Section	Description	Method	Qualification	Verification Statement Section
3.1.2.5.4.	Connecting hardware.			4.1.2.5.4.
3.1.2.5.4.a.	untitled	Exam	X	4.1.2.5.4.a.
3.1.2.5.4.b.	untitled	Exam	X	4.1.2.5.4.b.
3.1.2.5.4.c.	untitled	Test	X	4.1.2.5.4.c.
3.1.2.5.4.d.	untitled	Test	X	4.1.2.5.4.d.
3.1.2.5.4.e.	Snaphooks and carabiners.			4.1.2.5.4.e.
3.1.2.5.4.e.i.	untitled	Demo	X	4.1.2.5.4.e.i.
3.1.2.5.4.e.ii.	untitled	Demo	X	4.1.2.5.4.e.ii.
3.1.2.5.4.e.iii.	untitled	Demo	X	4.1.2.5.4.e.iii.
3.1.2.5.4.e.iv.	untitled	Test	X	4.1.2.5.4.e.iv.
3.1.2.5.4.e.v.	untitled	Test	X	4.1.2.5.4.e.v.
3.1.3.	Equipment carriage.			4.1.3.
3.1.3.1.	Mission equipment interfaces.			4.1.3.1.
3.1.3.1.1.	untitled	Demo	X	4.1.3.1.1.
3.1.3.1.2.	untitled	Demo	X	4.1.3.1.2.
3.1.3.2.	Loss-prevention component.	Exam	X	4.1.3.2.
3.1.3.3.	Statically located equipment.			4.1.3.3.
3.1.3.3.1.	untitled	Exam	X	4.1.3.3.1.
3.1.3.3.2.	untitled	Demo	X	4.1.3.3.2.
3.1.3.3.3.	untitled	Demo	X	4.1.3.3.3.
3.1.3.3.4.	untitled	Demo	X	4.1.3.3.4.
3.1.3.4.	Holster for the defensive weapon.			4.1.3.4.
3.1.3.4.1.	untitled	Exam	X	4.1.3.4.1.
3.1.3.4.2.	untitled	Demo	X	4.1.3.4.2.
3.1.3.4.3.	untitled	Demo	X	4.1.3.4.3.
3.1.4.	Flotation.			4.1.4.
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3.1.4.1.1.	Integral flotation component.	Exam	X	4.1.4.1.1.
3.1.4.1.2.	Primary and contingency cells.	Exam	X	4.1.4.1.2.
3.1.4.1.3.	Helmet compatibility.	Exam	X	4.1.4.1.3.
3.1.4.1.4.	Buoyancy.	Demo	X	4.1.4.1.4.
3.1.4.1.5.	Removable bladder.	Demo	X	4.1.4.1.5.
3.1.4.1.6.	Pressure.	Test	X	4.1.4.1.6.
3.1.4.1.7.	Fatigue.	Test	X	4.1.4.1.7.
3.1.4.1.8.	Leakage.	Test	X	4.1.4.1.8.
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3.1.4.2.1.	Manual actuation.	Exam	X	4.1.4.2.1.
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Requirement Statement Section	Description	Method	Qualification	Verification Statement Section
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3.1.4.2.4.	Locking oral inflation tubes.	Demo	X	4.1.4.2.4.
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3.1.4.3.	In-water performance.			4.1.4.3.
3.1.4.3.1.	Auto-righting, conscious.	Demo	X	4.1.4.3.1.
3.1.4.3.2.	Auto-righting, unresponsive.	Demo	X	4.1.4.3.2.
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3.1.4.3.4.	Freeboard.	Demo	X	4.1.4.3.4.
3.1.4.3.5.	One-handed access and operation (immersed).	Demo	X	4.1.4.3.5.
3.1.4.3.6.	Water survival mobility.	Demo	X	4.1.4.3.6.
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3.2.1.1.	Weight reduction.	Exam	X	4.2.1.1.
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3.2.2.	Low luster.	Exam	X	4.2.2.
3.2.3.	Dissimilar metals.	Exam	X	4.2.3.
3.2.4.	Tailorability.	Demo	X	4.2.4.
3.2.5.	Anthropometric sizing.			4.2.5.
3.2.5.1.	Size distribution.	Exam	X	4.2.5.1.
3.2.5.2.	Basis of issue.	Demo	X	4.2.5.2.
3.2.6.	Signature protection.			4.2.6.
3.2.6.1.	Visual protection.	Test	X	4.2.6.1.
3.2.6.2.	Infrared protection.	Test	X	4.2.6.2.
3.2.6.3.	Aural protection.	Demo	X	4.2.6.3.
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3.2.7.	Labeling.	Analysis	X	4.2.7.
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3.3.	Interfaces.			4.3.
3.3.1.	ACE to clothing and equipment interfaces.			4.3.1.
3.3.1.1.	Thermal Layered Clothing.			4.3.1.1.
3.3.1.1.1.	untitled	Demo	X	4.3.1.1.1.
3.3.1.1.2.	untitled	Demo	X	4.3.1.1.2.
3.3.1.2.	Over Water Equipment.			4.3.1.2.
3.3.1.2.1.	untitled	Demo	X	4.3.1.2.1.

Requirement Statement Section	Description	Method	Qualification	Verification Statement Section
3.3.1.2.2.	untitled	Demo	X	4.3.1.2.2.
3.3.1.3.	Chemical/Biological (CB) Ensemble.			4.3.1.3.
3.3.1.3.1.	untitled	Demo	X	4.3.1.3.1.
3.3.1.3.2.	untitled	Demo	X	4.3.1.3.2.
3.3.1.4.	Helmet.			4.3.1.4.
3.3.1.4.1.	untitled	Demo	X	4.3.1.4.1.
3.3.1.4.2.	untitled	Demo	X	4.3.1.4.2.
3.3.1.4.3.	untitled	Demo	X	4.3.1.4.3.
3.3.2.	ACE to aircraft interfaces.			4.3.2.
3.3.2.1.	untitled	Demo	X	4.3.2.1.
3.3.2.2.	untitled	Demo	X	4.3.2.2.
3.3.2.3.	untitled	Demo	X	4.3.2.3.
3.4.	Fabric properties and finishes.			4.4.
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3.4.2.1.	untitled	Test	X	4.4.2.1.
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3.4.3.	Water repellency.	Test	X	4.4.3.
3.4.4.	Non-corrosive finishes.	Analysis	X	4.4.4.
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3.5.	Environmental performance.			4.5.
3.5.1.	High-temperature storage.	Test	X	4.5.1.
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3.5.3.	Humidity.	Test	X	4.5.3.
3.5.4.	Fungus.	Test	X	4.5.4.
3.5.5.	Salt fog.	Test	X	4.5.5.
3.5.6.	Rain.	Test	X	4.5.6.
3.5.7.	Blowing dust.	Test	X	4.5.7.
3.5.8.	Blowing sand.	Test	X	4.5.8.
3.5.9.	Fluid contamination.	Test	X	4.5.9.
3.6.	Integrated Logistics Support (ILS).			4.6.
3.6.1.	Aviation Unit Maintenance (AVUM).	Analysis/ Demo	X	4.6.1.
3.6.2.	Time to reconfigure.	Demo	X	4.6.2.
3.7.	Human Systems Integration (HSI).			4.7.
3.7.1.	Human factors engineering.			4.7.1.
3.7.1.1.	Freedom of movement.	Demo	X	4.7.1.1.
3.7.1.2.	Mission compatibility.			4.7.1.2.
3.7.1.2.1.	untitled	Demo	X	4.7.1.2.1.

Requirement Statement Section	Description	Method	Qualification	Verification Statement Section
3.7.1.2.2.	untitled	Demo	X	4.7.1.2.2.
3.7.1.2.3.	untitled	Demo	X	4.7.1.2.3.
3.7.1.2.4.	untitled	Demo	X	4.7.1.2.4.
3.7.1.3.	Unassisted donning/doffing.			4.7.1.3.
3.7.1.3.1.	untitled	Demo	X	4.7.1.3.1.
3.7.1.3.2.	untitled	Demo	X	4.7.1.3.2.
3.7.1.4.	Sensory acuity.			4.7.1.4.
3.7.1.4.1.	untitled	Demo	X	4.7.1.4.1.
3.7.1.4.2.	untitled	Demo	X	4.7.1.4.2.
3.7.1.4.3.	untitled	Demo	X	4.7.1.4.3.
3.7.1.5.	Tactile identification.	Demo	X	4.7.1.5.
3.7.2.	Soldier survivability.			4.7.2.
3.7.2.1.	Medical access.	Demo	X	4.7.2.1.
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3.8.	Reliability and Maintainability (R&M).			4.8.
3.8.1.	Mean Time To Repair (MTTR).	Demo	X	4.8.1.
3.8.2.	Maintenance Ratio (MR).	Analysis	X	4.8.2.

## 5. PACKAGING

For acquisition purposes, the packaging requirements shall be as specified in the contract or order. When packaging of materiel is to be performed by Department of Defense (DoD) or in-house contractor personnel, these personnel need to contact the responsible packaging activity to ascertain packaging requirements. Packaging requirements are maintained by the Inventory Control Point's packaging activities within the Military Service or Defense Agency, or within the military service's system commands. Packaging data retrieval is available from the managing Military Department's or Defense Agency's automated packaging files, CD-ROM products, or by contacting the responsible packaging activity.

## 6. NOTES

This section contains information of a general or explanatory nature that may be helpful, but is not mandatory.

### 6.1. Intended use.

The ACE performance requirements specified herein characterize a modular system that is primarily worn by individual aircrew members during both mounted and dismounted operations. The ACE provides integrated carriage of survival gear items for both land and water survival requirements. The ACE provides torso ballistic protection and a lifting/attachment function for rescue, as well as a cabin aircraft safety restraint. The ACE will enhance protection and survival of the wearer against specific hazards associated with missions and with escape, evasion, rescue, and insertion operations during land and/or over water operations in both natural and battlefield environments.

### 6.2. Acquisition requirements.

Acquisition documents should specify the following:

- a) Title, number, and date of this document, including any amendments
- b) Quantity required
- c) Whether pre-production items inspection is required
- d) Number of pre-production samples required
- e) Size tariff, if applicable
- f) Applicable Government patterns and drawings, including revisions
- g) Directions to obtain Purchase Description(s) should be indicated in the solicitation.
- h) Packaging required
- i) Color (solid and print), including spectral reflectance value table
- j) Accept/reject criteria

### 6.3. Standard sample.

The color (solid and print) of the ACE will be specified by the contracting activity. For access to standard samples, contact the contracting activity issuing the invitation for bid.

### 6.4. Acronyms and abbreviations.

72-HSE	72-Hour Survival Equipment
A2CU	Army Aircrew Combat Uniform
AAIH	Apache Aircrew Integrated Helmet
AATCC	American Association of Textile Chemists and Colorists
ACE	Aircrew Combat Equipment
ALSE	Aircrew Life Support Equipment
ANSI	American National Standards Institute
ANVIS	Aviator's Night Vision Imaging System
AR	Army Regulation
ASSE	American Society of Safety Engineers
ASSP	American Society of Safety Professionals
ASTM	American Society for Testing Materials
Atm	Atmosphere
AVUM	Aviation Unit Maintenance
BD	Breathing Device
C	Celsius
CB	Chemical/Biological
CDDM	Color Day Display Module
CEPS	Communication Enhancement and Protection System
CHMD	Common Helmet Mounted Display
CIE	International Commission on Illumination
CLEPIR	Clear Laser Eye Protection for Infrared
CNDM	Color Night Display Module

CSEL	Combat Survivor Evader Locator
DoD	Department of Defense
EAWIS	Encryptable Aircrew Wireless Intercom System
ECV	Environmental Control Vest
EME	Enhanced Mobile Equipment
EP	Evaluation Procedure
ESAPI	Enhanced Small Arms Protective Insert
EWOL	Extreme Weather Outer Layer
F	Fahrenheit
FBH	Full-Body Harness
FR	Fire Resistant
FREE	Fire Resistant Environmental Ensemble
HDU	Helmet Display Unit
HSI	Human Systems Integration
HTK	Helmet Tracking Kit
IAW	In Accordance With
IHU	Integrated Helmet Unit
ILS	Integrated Logistics Support
IWOL	Intermediate Weather Outer Layer
JP	Jet Propellant (as in JP-8)
JP	Jungle Penetrator (see 6.9)
JSAM	Joint Service Aviation Mask
K	Kelvin
kN	Kilonewton(s)
Lb	Pound(s)
Lbf	Pound(s)-force
LISA	Lightweight Immersion Suit for Aircrew
LJPAGE	Lightweight Joint Protective Air Crew Ensemble
LPT	Liquid Pass Through
LPU	Life Preserver Unit
LRU	Line Replaceable Unit
LWECS	Lightweight Environmental Control System
mm	Millimeters
MOPP	Mission Oriented Protective Posture
MOS	Military Occupational Specialty
MPP	Multi-Purpose Pouch
MR	Maintenance Ratio
MTTR	Mean-Time-to-Repair
N/A	Not Applicable
NATO	North Atlantic Treaty Organization
NCM	Non-rated (Air) Crew Member
NSN	National Stock Number
O	Objective
OPC	Oxygen Pulse Controller
PHODS	Portable Helicopter Oxygen Delivery System
PSGC	Primary Survival Gear Carrier
R&M	Reliability and Maintainability
RWH	Rotary Wing Helmet
SABI	Soft Armor Ballistic Insert
SEA	Survival Egress Air
SFG	Summer Flyers Gloves
T	Threshold
TR	Technical Report
UBD	Underwater Breathing Device
WED	Wireless Encryption Device

## 6.5. Definitions.

Anchorage. (Ref. ANSI/ASSE Z359.0-2012) A secure connecting point or a terminating component of a fall protection system or rescue system capable of safely supporting the impact forces applied by a fall protection system.

CASEVAC. Movement of casualties to initial treatment facilities and movement of casualties to medical treatment facilities in the combat zone. It does not include en route care by medical personnel and implies that nonmedical assets (UH-60s or CH-47s) are being used to move casualties. CASEVAC is only used when the unit has a large number of casualties (exceeding the ability of the MEDEVAC aircraft to carry) or MEDEVAC is not available.

Crew Chief. A Non-rated (Air) Crew Member (NCM) that is required to perform cabin duties aboard an aircraft that are essential to its operation and/or specific flight mission.

Compatibility. The capability of two or more operational items/systems to exist or function as elements of a larger operational system or operational environment without mutual interference.

Copilot. A Warrant Officer or Commissioned Officer that assists in the performance of tasks and is an aviator who:

- a. is at a crew station with access to the flight controls but is not in command of the aircraft for the mission being flown;
- b. is at a crew station without access to the flight controls and performing crewmember duties required for the mission;
- c. is performing co-pilot duties at other than a flight crew station and is undergoing training or evaluation.

Dismounted Operations. Activity wherein the aircrew member is off-board the aircraft, normally on the ground, but may be climbing on exterior surfaces of the aircraft or in water after an emergency ditching. These operations include all activities not covered under mounted operations.

Dorsal. Pertaining to the back of the human body.

Energy Absorber. (Ref. ANSI/ASSE Z359.0-2012) A component whose primary function is to dissipate energy and limit deceleration forces which the Personal Fall Arrest System imposes on the body during fall arrest.

Extender. An extender is used to put space between the helicopter hoist hook-up point and the aircrew member's face when connected to a body harness. The legacy Air Warrior Extraction Strap is a sewn loop that is 15 inches in finished length.

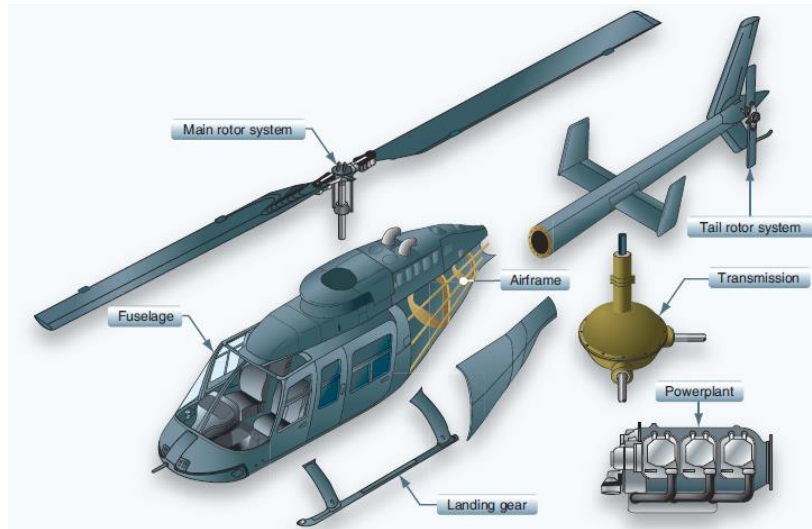
Flight Engineer. An NCM that is required to perform cabin duties on the aircraft that are essential to its operation and/or specific flight mission. MOS-qualified.

Flight Medic. An NCM that is required to perform cabin and medical duties aboard an aircraft as well as insertion that are essential to its operation and/or specific flight mission. MOS-qualified.

Full-Body Harness. (Ref. ANSI/ASSE Z359.0-2012) A body support designed to contain the torso and distribute the fall arrest forces over at least the upper thighs, pelvis, chest and shoulders.

Fuselage.

(ref. [https://www.faa.gov/regulations\\_policies/handbooks\\_manuals/aviation/helicopter\\_flying\\_handbook/](https://www.faa.gov/regulations_policies/handbooks_manuals/aviation/helicopter_flying_handbook/)) The fuselage, the outer core of the airframe, is an aircraft's main body section that houses the cabin which holds the crew, passengers, and cargo. The fuselage also houses the engine, the transmission, avionics, flight controls, and the power plant.



Integral. Relating to, or belonging as a part of the whole.

Integrated. Having different and distinct parts working together as an interrelated whole.

Lanyard. (Ref. ANSI/ASSE Z359.0-2012) A component consisting of a strap which typically has a connector at each end for connecting to the full-body harness and to an energy absorber or anchorage.

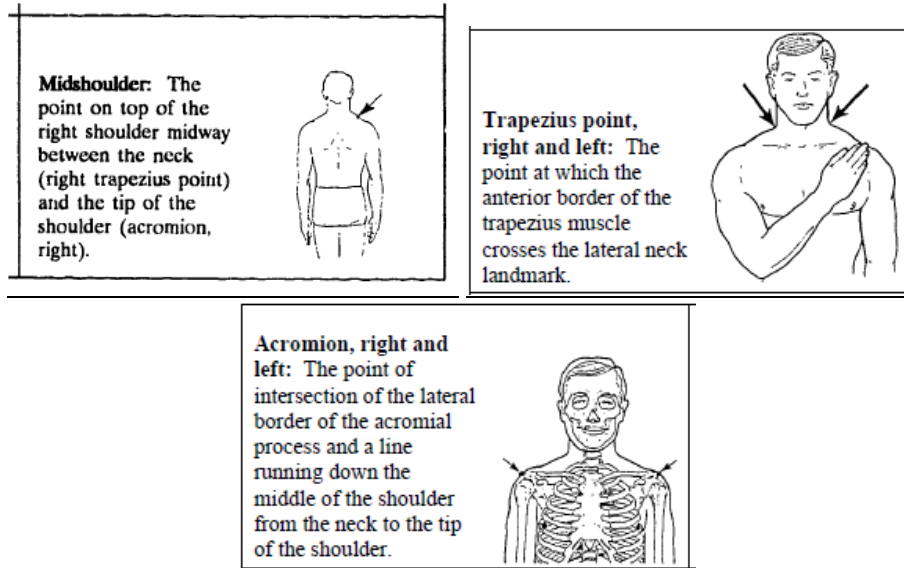
Line Replaceable Unit (LRU). An LRU is an essential support item which is removed and replaced at the field level to restore the end item to an operational ready condition.

Maintenance Ratio (MR). The measure of the total maintenance manpower (scheduled and unscheduled) burden required in an operational environment to maintain the system. The MR is the total of direct man-hours of maintenance performed on the system during a given period of time divided by the total operating time during the same period.

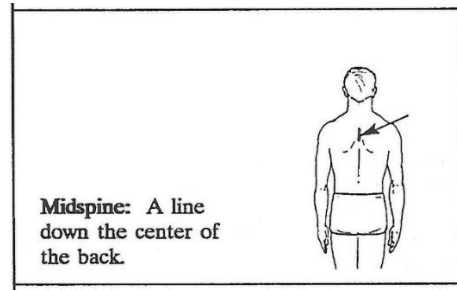
MEDEVAC. Timely, efficient movement and en route care by medical personnel (e.g. Flight Medic) of the wounded, injured, and ill persons, from the battlefield and other locations to medical treatment facilities.

Mean Time To Repair (MTTR). The average corrective maintenance time to perform an unscheduled maintenance action.

Mid-shoulder. The point on top of the right shoulder midway between the neck (right trapezius point) and the tip of the shoulder (acromion, right). Note: this definition also applies to the left shoulder.



Mid-spine. A line down the center of the back.



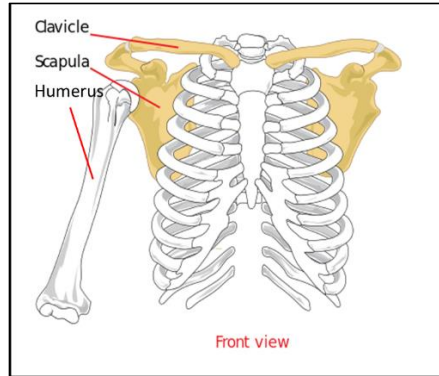
Mounted operations. An activity wherein the aircrew member is onboard the platform in or near his/her routine duty station.

Non-rated (Air) Crew Member (NCM). For aviation, NCM includes Crew Chief, Flight Engineer and Flight Medic.

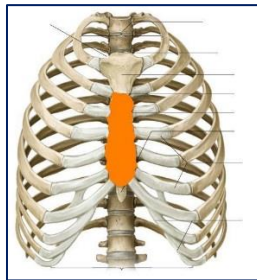
Objective. Any performance or condition identified as an objective is considered to be beneficial and advantageous but is not mandatory and essential to be fulfilled in order to be in compliance with that part of the specification.

Pilot. Crewmember who is assigned to a crew station with access to the flight controls and who is qualified and current in the aircraft mission, type, design, and series.

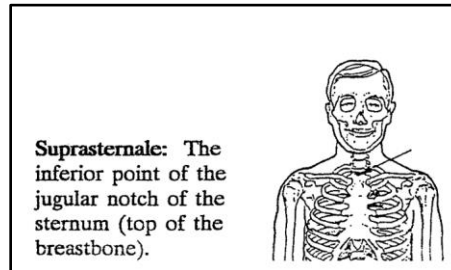
Shoulder blade. (also, Scapula (plural "Scapulae")) The bone that connects the humerus (upper arm bone) with the clavicle (collar bone). The scapula on the left side of the body is roughly a mirror image of the right scapula.



**Sternum.** The breastbone (see orange portion of illustration); a flat, narrow bone extending along the middle line of the ventral portion of a person's body connected with the clavicles and the true ribs.



**Suprasternal Notch.** (also, suprasternale) The inferior point of the jugular notch of the sternum (top of the breastbone).

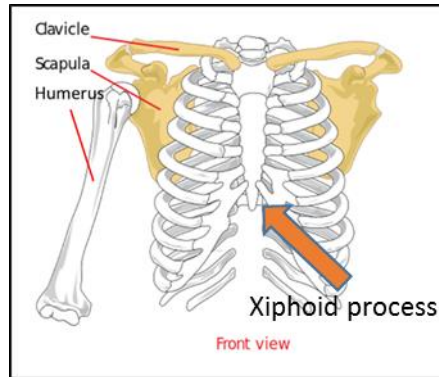


**Textile.** A fabric structure or webbing made by interlacing yarns comprised of natural or synthetic fibers.

**Threats.** Rotary-wing and fixed-wing aircrews fight and survive on battlefields, day or night, over land or water, and in worldwide climatic environments. Battlefield threats are identified in the System Threat Analysis and, as a minimum, include: Ballistic, Electronic Countermeasures, Nuclear/Biological/Chemical, Directed Energy Weapons, electronic attack systems, and a vast array of conventional weapons. Aircrews that are forced down, whether on enemy held territory/water or unoccupied wilderness areas must survive against a host of naturally occurring threats and actively participate in effecting their own rescue.

**Threshold.** Any performance or condition identified as threshold is at a minimum, mandatory and essential to be fulfilled in order to be in compliance with that part of the specification.

**Xiphoid Process.** An extension from the most inferior point on the sternum where the lowest ribs are attached.



**6.6. Hoisting and fall protection equipment information.**

- a. *Hoist extraction* is a post-accident event. The aircrew member is extracted from the accident site by connecting to a utility (UH-60 and UH-72) or cargo (CH-47) helicopter hoist, which then raises the aircrew member to the aircraft. The person enters the helicopter cabin with assistance. As part of the accident investigation, all of the ACE components in use at the time of the accident are turned over to the accident investigation board, ending the service life of these components.
- b. *External attachment to the fuselage* is a post-accident event. The aircrew member is retrieved from the accident site on an attack (AH-64) helicopter by sitting and connecting to designated locations on the exterior of the aircraft. Attack helicopters do not have cabin space for passengers. As part of the accident investigation, all of the ACE components in use at the time of the accident are turned over to the accident investigation board, ending the service life of these components.
- c. *In-cabin restraint* refers to routine fall protection for non-rated aircrew members in utility (UH-60 and UH-72) and cargo (CH-47) aircraft. The restraint is intended to prevent accidental falls from the aircraft cabin. In the case of a fall in excess of two feet of vertical height, all of the ACE components in use at the time of the accident are turned over to the accident investigation board, ending the service life of these components.
- d. *Insertion* is a MEDEVAC (see 6.5) and CASEVAC (see 6.5) activity in utility helicopters. In this case, the ACE components are used repetitively by medics to assist in the rescue of downed service members.

**6.7. Flotation information.**

While most unencumbered adults require 7 to 12 lbf of buoyancy to keep their head above calm water, the 65 lbf flotation capability prescribed by this specification is needed to:

- a. increase the margin of safety for less buoyant body types;
- b. counteract dense (negatively buoyant) mission equipment worn by aircrew;
- c. maintain adequate freeboard (distance from mouth to water surface) under rough seas conditions; and
- d. compensate for reduced buoyancy effects of deep water deployment of the flotation device, which may be as much as 30 meters below the surface upon egress from the aircraft.

Many Air Warrior equipment components, such as body armor plates, weapons, and ammunition, have a density in excess of one (and therefore have negative buoyancy). Therefore each mission equipment item with negative buoyancy must be counteracted with additional flotation capability (or positive buoyancy).

For events that require flotation systems to be deployed, Army Soldiers are trained to stay seated until the helicopter has stopped its violent motion and then use a specified procedure to egress. The inflatable device is NOT deployed until egress from the helicopter is complete to avoid becoming trapped inside the aircraft. Helicopters usually begin their descent slowly, however, there is a possibility that the aircrew member may be as much as 30 meters (~100 feet) below the surface prior to egress. Below that depth there is little chance of survival.

The effect of the increasing pressure at depth can be calculated. One atmosphere is equal to the weight of the earth's atmosphere at sea level, which is about 14.6 lb per square inch gauge (psig). At sea level, each square inch of an object's surface is subjected to a force of 14.6 lb. The pressure increases about one atmosphere (atm) for every 10 meters (~33 feet) of water depth. So at 30 meters of depth, the pressure is equivalent to 4 atm.

Knowing that the relationship of Pressure (P) and Volume (V) is approximately linear and inversely proportional, then:

$$P_1 V_1 = P_2 V_2.$$

And if:

$P_1$  is the pressure of the environment at the water surface;

$V_1$  is the volume of the flotation device at the water surface;

$P_2$  is the pressure of the environment at a water depth of 30 meters;

$V_2$  is the volume of the flotation device at a water depth of 30 meters;

And since at a depth of 30 meters, pressure is increased fourfold (1 atm at the surface and 4 atm at depth), then:

$$P_2 = 4 P_1.$$

Substituting and solving for  $V_2$ :

$$V_2 = (P_1 V_1) / (4 P_1)$$

$$V_2 = 1/4 (V_1)$$

Since buoyancy is proportional to submerged volume, and since the volume of the flotation device at 30 meters of depth is calculated to be 1/4 of the surface volume, then buoyancy at 30 meters of depth is also 1/4 of the surface buoyancy. Therefore, an inflatable flotation device with 65 lbf surface buoyancy may only provide about 16 lbf buoyancy at 30 meters of depth. This reduced amount of buoyancy will assist, but is likely not to be sufficient, to bring the aircrew member to the surface if they are loaded down with ammunition and ceramic ballistic plates.

Aircrew are trained to assist in their own rescue by determining which direction is up (this might not be obvious in the confusion of a ditching and in dark or murky water) and swim toward the surface. In the ascent, if the aircrew member is able to deploy the flotation device, the volume will increase and provide increasing assistance in flotation and rate of rising to the surface. But it is important to keep these principles in mind when developing Army aircrew flotation devices.

#### 6.8. Aviation publications of interest.

AR 95-1, Flight Regulations, Chapter 8 Aviation Life Support, Section II Aviation Life Support Equipment.

AR 70-38, Research, Development, Test and Evaluation of Materiel for Extreme Climatic Conditions.

FM 8-10-6, Medical Evacuation in a Theater of Operations, Tactics, Techniques, and Procedures, chapter 11 "Use of the High Performance Hoist in Medical Evacuation Operations."

FM 21-76, US Army Survival Manual.

Life-Saving Appliances including LSA Code, 2010 Edition, International Maritime Organization, ISBN 978-92-801-1507-9.

MS18027(AS), Helicopter Rescue Hook. MS18027-2 and -2A are common hooks found on Army hoist systems for utility and cargo helicopters.

#### 6.9. Static dissipation.

Static dissipation requirements in clothing are, at this time, not well defined. While the effect of static build-up is commonly experienced, the contribution from clothing is poorly characterized.

The two biggest risks for electrostatic discharge in Army Aviation are: 1) discomfort during extraction or insertion exercises and during open door (windy) missions from what can be repeated static shocks; and 2) ignition of flammable vapors. At the time of this writing, there have been no ignition incidents reported through Army safety channels that were caused by static electricity discharged from body-mounted clothing or equipment. Conversely, aircrew who hoist regularly and those who fly “doors-open” will be recipients of static shocks. Our goal is to reduce the incidence of shock and to maintain the record of safety.

Hoisting exercises create static on the system (e.g. a system consisting of aircraft hoist, Jungle Penetrator (JP) and Soldier) both on ascent and descent. Friction between the air and the system builds up free electrons on the system surface. Aircrew members are taught to discharge static by allowing the JP to hit the ground before a dismount, or before they grab it while standing on the ground. The risk of discomfort (intermittent shocks on the trip up or down) during extraction or insertion exercises is reduced by ensuring that the outer layer of the aircrew member's attire is conductive, facilitating discharge of the electron build-up. Since the Army doesn't have a great way to measure the threshold weight of conductive fiber that is required to achieve this on textile-based equipment, the approach has historically been to add up to 3% conductive fiber to the fabric content on anything that might be an outer layer on an aircrew member.

At a recent Hoist Training class for medics at Ft Rucker, the instructor mentioned his air crew don't experience nearly as many static shocks during hoisting exercises while wearing the PM Air Warrior authorized clothing and equipment. He knew that the uniform was static conductive, but he told the class that the PSGC was not because it was made of regular Cordura™. When he was informed that the Army PSGC Cordura™ fabric does contain a static dissipative fiber (it is both static conductive and FR), he was delighted to know that what he was observing was indeed an engineering feat. It also confirmed that static dissipative fibers are important in outer fabric layers of aircrew ensembles, even if the effect is not directly measurable.

The protective effect is degraded in dusty environments. Aircrew have reported receiving shocks all the way up and down while on an aircraft hoist. Unfortunately, barring any new developments in technology, there isn't much that can be done to mitigate that issue at this time. We simply must rely on the historical practice of including the static dissipative characteristic. Though we don't know the exact amount of conductive fiber necessary to include in textiles, we do know that the aircrew requirement exists.

#### 6.10. Humanetics Torso Dummy.

Humanetics Torso Dummy Model 131-001 is, at the time of writing of this specification, the test dummy used for dynamic tests of parachute harnesses at the Aerial Delivery Engineering Support Team (ADEST) at the Natick, MA location for the U.S. Army Combat Capabilities Development Command – Soldier Center (CCDC-SC). Detailed information can be found at <https://www.humaneticsatd.com/crash-test-dummies/aerospace-military/parachute>. The website contains the following descriptive information:

“The torso corresponds to a 95th-percentile male, 6 feet 1 inch tall. The torso weighs 188 + 2 lbs. The normal weight of a young male of this stature is 211 lbs. Hence, there is a nominal 23-lb weight allowance for instrumentation. The torso structure is a steel weldment, terminating at

the base of the neck and at the shoulders in steel flanges which mate with manganese bronze caps.

The structure is machined to receive instrumentation packages, which extend into the torso. The torso is terminated in a de-mountable steel 'kick-plate,' providing access to the stub-leg instrumentation cavities. Two chest cavities are provided, each with its own flesh covering, for installation of accelerometers or other instrumentation and for junction strips and wiring.

The flesh is molded of a very tough vinyl about the torso structure. Although this dummy, when instrumented, has a weight corresponding to a man 6-feet 1-inch tall, it will reach a higher terminal velocity due to the absence of arms and legs which produces lower drag. It will also rotate faster than a human due to lack of human energy-absorption, lower moment of inertia, and lack of dynamic response.”

6.11. Berry Amendment.

The Berry Amendment (10 U.S.C. 2533a) may be applicable to the components and end items.

## RATED AND NON-RATED (AIR) CREW MEMBER CONFIGURATIONS

### A.1 SCOPE

#### A.1.1 Scope.

This appendix contains tables which describe the Rated (pilot and copilot) and Non-rated (Crew Chief (see 6.5), Flight Engineer (see 6.5), Flight Medic (see 6.5)) Aircrew Member equipment configurations used as test cases for PM Air Warrior evaluations. There are innumerable potential iterations of equipment configurations based on mission, terrain and crew position. Definition of five mission/terrain configurations with cockpit and cabin crew member variants serves to provide better comparison of evaluation results. This Appendix is not a mandatory part of the specification. The information contained herein is intended for guidance only.

#### A.1.2 General.

Equipment listed in red comprise the Air Warrior components that provide capabilities parallel to ACE functional requirements. These components will be either used or replaced by the ACE solution to achieve the target weight reduction. Air Warrior equipment weights are provided in Appendix B for comparison. All acronyms in these configuration tables are defined in paragraph 6.4.

#### A.1.3 References.

### GOVERNMENT DRAWINGS

#### 1050921B 72-Hour Survival Equipment

Note: Components of part number 1050921-1 72-Hour Survival Equipment (72-HSE) are defined in drawing 1050921.

(Copies of these documents are available upon request from Product Manager – Air Warrior (PM-AW), 6726 Odyssey Drive NW, SFAE-SDR-AW, Huntsville, AL 35806.)

TABLE VIII. *Combat Basic Over Land configurations.*

Combat Basic Over Land Pilot (70/40°F, Day)			
Donning Order	Description		
Layer 1	T-Shirt, Under Shorts, Socks		
Layer 2	Duty Uniform (A2CU) w/ Rigger's Belt		
Layer 3	Temperate Weather Boots (note: trouser over boot)		
Body Armor (Pilot)	Body Armor Shell Assembly with SABI, Front ESAPI Plate		
Load Carriage	PSGC Vest Harness		
Equipment	On vest front: • 2 Non-Locking Carabiners, Small Square Pouch w/Extraction Strap • 1 Combo Pouch with strobe/light and folding knife • 1 Multi-Purpose Pouch (MPP) and tourniquet • CSEL in Radio Pouch	In right PSGC pocket: • Safety Restraint Tether	In left and right PSGC pockets: • 72-HSE (1050921-1)
Weapon	Holster ( contains 3 Magazines & 9mm Sig Sauer)		
Mission Specific	N/A		
Gloves	Summer Flyers Glove (SFG) (note: cuff over glove)		
Helmet	Rotary Wing Helmet (RWH) with ANVIS, HTK, Lip Light, CDDM, CEPS, CLEPIR spectacles		

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Combat Basic Over Land Non-rated Crew Member (NCM) (70/40°F, Day)			
Donning Order	Description		
Layer 1	T-Shirt, Under Shorts, Socks		
Layer 2	Duty Uniform (A2CU) w/ Rigger's Belt		
Layer 3	Temperate Weather Boots (note: trouser over boot)		
Body Armor (NR-Crew)	Body Armor Shell Assembly with SABI, Front and Back ESAPI Plates		
Load Carriage	PSGC Vest Harness		
Equipment	On vest front: • 2 Non-Locking Carabiners, Small Square Pouch w/Extraction Strap • 1 Combo Pouch with strobe/light and folding knife • 1 Multi-Purpose Pouch (MPP) and tourniquet • CSEL in Radio Pouch • EAWIS /WED in EAWIS WED EME Pouch	In right PSGC pocket: • Safety Restraint Tether	In left and right PSGC pockets: • 72-HSE (1050921-1)
Weapon	Holster (contains 3 Magazines & 9mm Sig Sauer)		
Mission Specific	Personal Restraint Tether w/Swivel, Quick-Release Extension Tether		
Gloves	Summer Flyers Glove (note: cuff over glove)		
Helmet	Rotary Wing Helmet (RWH) with ANVIS, Lip Light, maxillofacial shield w/lip light adapter, CEPS, CLEPIR spectacles		

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TABLE IX. *Combat Basic Over Water configurations.*

Combat Basic Over Water (<50 Nautical Miles from shore) Pilot (70/40°F, Day)			
Donning Order	Description		
Layer 1	T-Shirt, Under Shorts, Socks		
Layer 2	Duty Uniform (A2CU) w/ Rigger's Belt		
Layer 3	Temperate Weather Boots (note: trouser over boot)		
Body Armor (Pilot)	Body Armor Shell Assembly with SABI, Front ESAPI Plate		
Load Carriage	PSGC Vest Harness		
Equipment	On vest front: • 2 Non-Locking Carabiners, Small Square Pouch w/Extraction Strap • 1 Combo Pouch with strobe/light and folding knife • 1 Multi-Purpose Pouch (MPP) and tourniquet • CSEL in Radio Pouch	In right PSGC pocket: • Safety Restraint Tether	In left and right PSGC pockets: • 72-HSE (1050921-1)
Weapon	Holster (contains 3 Magazines & 9mm Sig Sauer); Note – Holster strap is routed UNDER the flotation collar		
Mission Specific	Adapter Platform & Bottle Pouch, SEA-LV2 Underwater Breathing Device (UBD), Mouthpiece Cover, Yoke Life Preserver (LPU-40/P)		
Gloves	Summer Flyers Glove (note: cuff over glove)		
Helmet	Rotary Wing Helmet (RWH) with ANVIS, HTK, CDDM, CEPS, CLEPIR spectacles		

Combat Over Water (<50 Nautical Miles from shore) NCM (70/40°F, Night)			
Donning Order	Description		
Layer 1	T-Shirt, Under Shorts, Socks		
Layer 2	Duty Uniform (A2CU) w/ Rigger's Belt		
Layer 3	Temperate Weather Boots (note: trouser over boot)		
Body Armor (NR-Crew)	Body Armor Shell Assembly with SABI, Front and Back ESAPI Plates		
Load Carriage	PSGC Vest Harness		
Equipment	On vest front: • 2 Non-Locking Carabiners, Small Square Pouch w/Extraction Strap • 1 Combo Pouch with strobe/light and folding knife • 1 Multi-Purpose Pouch (MPP) and tourniquet • CSEL in Radio Pouch • EAWIS /WED in EAWIS WED EME Pouch	In right PSGC pocket: • Safety Restraint Tether	In left and right PSGC pockets: • 72-HSE (1050921-1)
Weapon	Holster (contains 3 Magazines & 9mm Sig Sauer); Note – Holster strap is routed UNDER the flotation collar		
Mission Specific	Adapter Platform & Bottle Pouch, SEA-LV2 Underwater Breathing Device (UBD), Mouthpiece Cover, Yoke Life Preserver: LPU-40/P, Personal Restraint Tether w/Swivel, Quick-Release Extension Tether		
Gloves	Summer Flyers Glove (note: cuff over glove)		
Helmet	Rotary Wing Helmet (RWH) with ANVIS, maxillofacial shield w/ lip light mount, lip light, CEPS, CLEPIR spectacles		

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TABLE X. *Combat Hot-Dry MOPP 4 Over Land configurations.*

Combat Hot-Dry Over Land Pilot (120/90°F, MOPP 4, Day)			
Donning Order	Description		
Layer 1	T-Shirt optional, Under Shorts, Socks		
Layer 2	Environmental Control Vest (ECV)		
Layer 3	LJPACE		
Layer 4	Temperate Weather Boots (note: trouser over boot)		
Layer 5	Alternate Footwear System (Chem boots)		
Layer 6	M-45 chemical protective hood		
Body Armor (Pilot)	Body Armor Shell Assembly with SABI, Front ESAPI Plate		
Load Carriage	PSGC Vest Harness		
Equipment	On vest front: <ul style="list-style-type: none"> <li>• 2 Non-Locking Carabiners, Small Square Pouch w/Extraction Strap</li> <li>• 1 Combo Pouch with strobe/light and folding knife</li> <li>• 1 Multi-Purpose Pouch (MPP) and tourniquet</li> <li>• CSEL in Radio Pouch</li> </ul>	In right PSGC pocket: <ul style="list-style-type: none"> <li>• Safety Restraint Tether</li> </ul>	In left and right PSGC pockets: <ul style="list-style-type: none"> <li>• 72-HSE (1050921-1)</li> </ul>
Weapon	Holster (contains 3 Magazines & 9mm Sig Sauer)		
Mission Specific	M-45 blower in blower pouch		
Gloves	SFG over 7-mil butyl rubber gloves with cotton liners (note: cuff over glove)		
Helmet	Rotary Wing Helmet (RWH) with ANVIS, HTK, CDDM, CEPS, CLEPIR spectacles, M-45 mask and nose cup		

Combat Hot-Dry Over Land NCM (120/90°F, MOPP 4, Day)			
Donning Order	Description		
Layer 1	T-Shirt optional, Under Shorts, Socks		
Layer 2	Environmental Control Vest (ECV)		
Layer 3	LJPACE		
Layer 4	Temperate Weather Boots (note: trouser over boot)		
Layer 5	Alternate Footwear System (Chem boots)		
Layer 6	M-45 chemical protective hood		
Body Armor (NR-Crew)	Body Armor Shell Assembly with SABI, Front and Back ESAPI Plates		
Load Carriage	PSGC Vest Harness		
Equipment	On vest front: <ul style="list-style-type: none"> <li>• 2 Non-Locking Carabiners, Small Square Pouch w/Extraction Strap</li> <li>• 1 Combo Pouch with strobe/light and folding knife</li> <li>• 1 Multi-Purpose Pouch (MPP) and tourniquet</li> <li>• CSEL in Radio Pouch</li> <li>• EAWIS /WED in EAWIS WED EME Pouch</li> </ul>	In right PSGC pocket: <ul style="list-style-type: none"> <li>• Safety Restraint Tether</li> </ul>	In left and right PSGC pockets: <ul style="list-style-type: none"> <li>• 72-HSE (1050921-1)</li> </ul>
Weapon	Holster (contains 3 Magazines & 9mm Sig Sauer)		
Mission Specific	M-45 blower in blower pouch, Personal Restraint Tether w/Swivel, Quick-Release Extension Tether, Lightweight Environmental Control System (LWECS) and carrier, BP-180 Battery with pendant switch		
Gloves	SFG over 7-mil butyl rubber gloves with cotton liners (note: cuff over glove)		
Helmet	Rotary Wing Helmet (RWH) with ANVIS, maxillofacial shield, CEPS, CLEPIR spectacles M-45 mask and nose cup		

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TABLE XI. *Combat Moderate Cold Over Water configurations.*

Combat Moderate Cold Over Water (>50 NM from shore, 32°F water) Pilot (0/-20°F, Day)			
Donning Order	Description		
Layer 1	T-Shirt optional, Under Shorts, Cold Weather Socks		
Layer 2	Environmental Control Vest, modified for LISA compatibility		
Layer 3	FREE Base Layer Long Sleeve Undershirt and Long Drawers		
Layer 4	LISA with Shorty and LPT		
Layer 5	Temperate Weather Boots		
Body Armor (Pilot)	Body Armor Shell Assembly with SABI, Front ESAPI Plate		
Load Carriage	PSGC Vest Harness		
Equipment	On vest front: • 2 Non-Locking Carabiners, Small Square Pouch w/Extraction Strap • 1 Combo Pouch with strobe/light and folding knife • 1 Multi-Purpose Pouch (MPP) and tourniquet • CSEL in Radio Pouch	In right PSGC pocket: • Safety Restraint Tether	In left and right PSGC pockets: • 72-HSE (1050921-1)
Weapon	Holster (3 Magazines & 9mm Sig Sauer); Note – Holster strap is routed UNDER the flotation collar		
Mission Specific	Adapter Platform & Bottle Pouch, SEA-LV2 Underwater Breathing Device (UBD), Mouthpiece Cover, Yoke Life Preserver (LPU-40/P)		
Gloves	Cold Weather Gloves (note: cuff over glove)		
Helmet	Rotary Wing Helmet (RWH) with ANVIS, HTK, CDDM, CEPS, CLEPIR spectacles		

Combat Moderate Cold Over Water (>50 NM from shore, 32°F water) NCM (0/-20°F, Day)			
Donning Order	Description		
Layer 1	T-Shirt optional, Under Shorts, Cold Weather Socks		
Layer 2	Environmental Control Vest, modified for LISA compatibility		
Layer 3	FREE Base Layer Long Sleeve Undershirt and Long Drawers		
Layer 4	LISA with Shorty and LPT		
Layer 5	Temperate Weather Boots		
Body Armor (NR-Crew)	Body Armor Shell Assembly with SABI, Front and Back ESAPI Plates		
Load Carriage	PSGC Vest Harness		
Equipment	On vest front: • 2 Non-Locking Carabiners, Small Square Pouch w/Extraction Strap • 1 Combo Pouch with strobe/light and folding knife • 1 Multi-Purpose Pouch (MPP) and tourniquet • CSEL in Radio Pouch • EAWIS /WED in EAWIS WED EME Pouch	In right PSGC pocket: • Safety Restraint Tether	In left and right PSGC pockets: • 72-HSE (1050921-1)
Weapon	Holster (contains 3 Magazines & 9mm Sig Sauer); Note – Holster strap is routed UNDER the flotation collar		
Mission specific	Adapter Platform & Bottle Pouch, SEA-LV2 Underwater Breathing Device (UBD), Mouthpiece Cover, Yoke Life Preserver (LPU-40/P), Personal Restraint Tether w/Swivel, Quick-Release Extension Tether, LWECs and carrier, BP-180 Battery with pendant switch		
Gloves	Cold Weather Gloves (note: cuff over glove)		
Helmet	Rotary Wing Helmet (RWH) with ANVIS, maxillofacial shield, CEPS, CLEPIR spectacles		

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TABLE XII. *Combat Severe Cold Over Land High Altitude configurations.*

Combat Severe Cold Over Land Pilot (-40/-60°F, High Altitude, Night)			
Donning Order	Description		
Layer 1	T-Shirt, Under Shorts, Cold Weather Socks		
Layer 2	FREE Base Layer Long Drawers and Shirt		
Layer 3	FREE Mid-weight Long Drawers		
Layer 4	Duty Uniform (A2CU) w/ Rigger's Belt		
Layer 5	FREE IWOL Jacket and Pants		
Layer 6	Intermediate Cold Wet Boots (note: trouser over boot)		
Body Armor (Pilot)	Body Armor Shell Assembly with SABI, Front ESAPI Plate		
Load Carriage	PSGC Vest Harness		
Equipment	On vest front: <ul style="list-style-type: none"> <li>• 2 Non-Locking Carabiners, Small Square Pouch w/Extraction Strap</li> <li>• 1 Combo Pouch with strobe/light and folding knife</li> <li>• 1 Multi-Purpose Pouch (MPP) and tourniquet</li> <li>• CSEL in Radio Pouch</li> </ul>	In right PSGC pocket: <ul style="list-style-type: none"> <li>• Safety Restraint Tether</li> </ul>	In left and right PSGC pockets: <ul style="list-style-type: none"> <li>• 72-HSE (1050921-1)</li> </ul>
Weapon	Holster (contains 3 Magazines & 9mm Sig Sauer)		
Mission Specific	PHODS (bottle, regulator, nasal cannula, coiled hose), Adapter Platform, Bottle Pouch, OPC and OPC pouch		
Gloves	Cold Weather Gloves (note: cuff over glove)		
Neckwear	FREE Neck Gaiter		
Helmet	Rotary Wing Helmet (RWH) with ANVIS, HTK, CNDM, lip light, CEPS, CLEPIR spectacles		

Combat Severe Cold Over Land NCM (-40/-60°F, High Altitude, Night)			
Donning Order	Description		
Layer 1	T-Shirt, Under Shorts, Cold Weather Socks		
Layer 2	FREE Base Layer Long Drawers and Shirt		
Layer 3	FREE Mid-weight Long Drawers		
Layer 4	Duty Uniform (A2CU) w/ Rigger's Belt		
Layer 5	FREE IWOL Jacket and Pants		
Layer 6	FREE EWOL Pants and Liner		
Layer 7	Intermediate Cold Wet Boots (note: trouser over boot)		
Body Armor (NR-Crew)	Body Armor Shell Assembly with SABI, Front and Back ESAPI Plates		
Load Carriage	PSGC Vest Harness		
Equipment	On vest front: <ul style="list-style-type: none"> <li>• 2 Non-Locking Carabiners, Small Square Pouch w/Extraction Strap</li> <li>• 1 Combo Pouch with strobe/light and folding knife</li> <li>• 1 Multi-Purpose Pouch (MPP) and tourniquet</li> <li>• CSEL in Radio Pouch</li> <li>• EAWIS /WED in EAWIS WED EME Pouch</li> </ul>	In right PSGC pocket: <ul style="list-style-type: none"> <li>• Safety Restraint Tether</li> </ul>	In left and right PSGC pockets: <ul style="list-style-type: none"> <li>• 72-HSE (1050921-1)</li> </ul>
Weapon	Holster ( contains 3 Magazines & 9mm Sig Sauer)		
Mission specific	PHODS (bottle, regulator, nasal cannula, coiled hose), Adapter Platform, Bottle Pouch, OPC and OPC pouch, Personal Restraint Tether w/Swivel, Quick-Release Extension Tether		
Gloves	Cold Weather Gloves (note: cuff over glove)		
Neckwear	Neck Gaiter		
Helmet	Rotary Wing Helmet (RWH) with ANVIS, maxillofacial shield w/ lip light mount, lip light, CEPS, CLEPIR spectacles		

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AIR WARRIOR EQUIPMENT WEIGHTS

B.1 SCOPE

B.1.1 Scope.

This Appendix is not a mandatory part of the specification. The information contained herein is intended for guidance only

B.1.2 Applicability.

Paragraph 3.2.1 provides a weight requirement for ACE. This table delineates the weight of equipment current at the time of the writing of this specification.

TABLE XIII. *Reference weights of Air Warrior legacy equipment.*

Equipment	Part number in OCP Color Family	Quantity per Aircraft Member	Volume X Qty (in <sup>3</sup> )	Weight X Qty (pounds)	Comment
<b>Ballistic Protection Components:</b>					
Body Armor Shell Assembly (Medi)	1006038-1-Y	1	261.000	2.510	Sized item: includes Front and Back Shells
<b>PSGC, Gen 3 Components:</b>					
Vest Harness	1006021-1-1	1	360.000	3.810	
Small Square Pouch	1006025-1-1	1	4.880	0.086	Fits Extraction Strap and (2) Non-Locking Carabiners
Non-Locking Carabiner	1005974-1	2	1.040	0.290	Used for extraction into aircraft with cabin
Extraction Strap	1006032-1-1	1	2.750	0.070	Used for extraction into aircraft with cabin
Safety Restraint Tether	1006033-1-1	1	9.770	0.230	Used for external extraction
Multi-Purpose Pouch (MPP)	1006027-1-3	1	6.255	0.115	Fits tourniquet or one (9mm) Beretta magazine
Combo Pouch	1050946-1	1	4.983	0.150	Fits folding knife and strobe
Magazine Pouch, M-4	1006029-1-1	2	24.420	0.360	Fits two M-4 magazines
Radio Pouch	1006030-1-1	1	19.530	0.245	Fits CSEL radio
Adapter Platform	1006031-1-1	AR	14.250	0.142	Provides additional MOLLE-type panel
Utility Pouch	1006028-1-1	1	12.000	0.200	
Blower Pouch	1006022-1-1	AR	16.790	0.155	Fits M-45 mask blower
<b>Over Water Components:</b>					
Breathing Device (BD) Pouch	1006037-1-1	AR	11.000	0.215	Fits SEA-LV2 and PHODs bottles
Mouthpiece Cover	1051021-1	AR	11.000	0.055	Fits SEA-LV2 mouthpiece
Life Preserver, Yoke: LPU-40/P	1051001-1	AR	156.360	2.900	Attaches to PSGC Vest Harness
<b>High Altitude Components:</b>					
Oxygen Pulse Controller Pouch	1006043-1-1	AR	Incl w/PHODS	0.100	
<b>Crew Specific Parts:</b>					
Quick Release Extension Tether (QRET)	1050902-1-1	1	24.000	1.350	Used for fall restraint. Provides disconnection point within aircrew's reach. Includes locking carabiner.
Retaining Loop Abrasion Cover	1006036-1	1	1.220	0.015	Protects QRET from wear
Locking Carabiner, Restraint	1050905-1	2	4.638	1.160	
QRET Beaded Handle Cover	1050906-1	1	3.750	0.050	
EAWIS WED EME Pouch	1006055-1-1	1	19.530	0.190	Fits the NCM radio
<b>Soldier Equipment:</b>					
Universal Holster Assembly	1006045-1-1	1	189.230	1.630	Holds weapon and 3 extra magazines.
		<b>Total:</b>	<b>1158.396</b>	<b>16.028</b>	